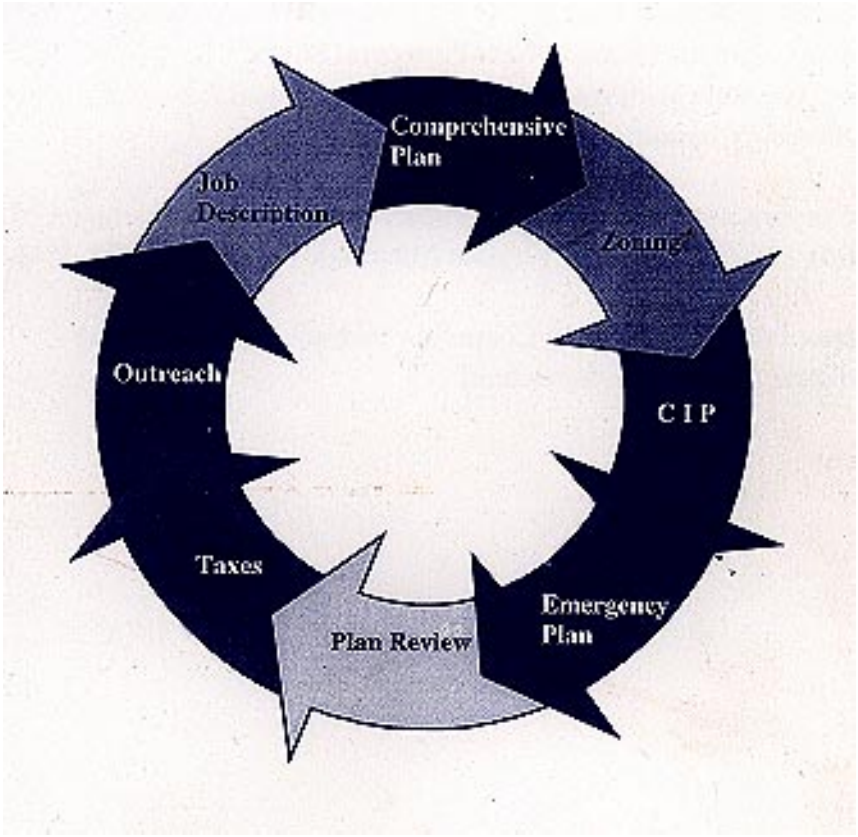
IMPLEMENTING WELLHEAD PROTECTION:
MODEL COMPONENTS FOR LOCAL GOVERNMENTS IN VIRGINIA



VIRGINIA GROUND WATER PROTECTION STEERING COMMITTEE

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This publication is part of a series of documents prepared by the Virginia Ground Water Protection Steering Committee. This series is aimed at increasing people's awareness of ground water, the need to protect and conserve this essential resource, and strategies and methods for accomplishing these goals. Funding for these projects has been provided through grants under the Clean Water Act (Section 106) from the U.S. Environmental Protection Agency. Reports in the series include:

- 1987 - Ground Water Protection Strategy for Virginia
- 1990 - Supplement to the Ground Water Protection Strategy for Virginia
- 1992 - Wellhead Protection: A Handbook for Local Governments
- 1993 - Wellhead Protection: Case Studies of Six Local Governments in Virginia
- 1995 - Supplement to the Ground Water Protection Strategy for Virginia
- 1988 to date - Groundwater Protection in Virginia: Annual Report of the Groundwater Protection Steering Committee, each year.

Copies of these reports can be obtained from Mary Ann Massie, Department of Environmental Quality, P. O. Box 10009, Richmond, Virginia 23240-0009 or call 804/698-4042.

The Ground Water Protection Steering Committee web site can be found at http://www.deq.state.va.us/gwpsc/home.html

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Preface

Who Should Read This Report?

This report is addressed to a number of audiences in recognition of the fact that wellhead protection must be a partnership process. Local governments, water supply system owners and consumers are all important stakeholders.

Local governments play a central role. First, local governments are unique in that they alone have the legal authority to employ tools such as the comprehensive plan, zoning and the capital improvement program. Since these tools are important components of wellhead protection, local governments are essential participants. Second, local governments have a responsibility to act as the protector of the overall community welfare by thinking ahead, anticipating problems and carrying out strategies to protect the public's interests. For these reasons, local governments are in the best position of all the local stakeholders to take the initiative to put wellhead protection on the community's agenda for study, discussion and action.

Owners of public water supply systems also play important roles, however. Owners can be of several types, which complicates wellhead protection. One type of owner is local government itself through its Department of Public Utilities (DPU). In this case, when local elected officials act to protect a well, they are protecting their own department's assets as well as the interest of the consuming public.

A slightly different ownership situation occurs when the well is the property of a Public Service Authority (PSA). While PSAs are created by local governments, they operate independently. When local elected officials act to protect a PSA well, they are still protecting a publicly owned asset. The initative for wellhead protection might come from local government in its leadership role or from the PSA as managers of their system. Ideally, both see the need for protection.

Another ownership situation is where the well or wells are owned by a non-governmental entity such as a subdivision Home Owner Association (HOA). Under federal and state definitions, a subdivision well is still a "public" well because it serves a segment of the public and is an asset of crucial importance to the community. This type of public well needs wellhead protection as much as a governmentally owned well and for this reason, the HOA may take the initiative to bring wellhead protection to the attention of local officials. Alternatively, the local government may contact the HOA seeking their participation and cooperation. Ideally there will emerge a partnership based on a recognition of mutual interest.

Finally, there are purely private or investor owned systems operated as businesses. By virtue of providing water to the public, these are also considered public under federal and state definitions. The public served by these wells deserves as much protection as other public water users. If a privately owned well is not protected and something happens, local governments may be expected to step in and take over the failed system.

Without belaboring the point regarding the many different kinds of public wells, it should also be noted that there are other types of public wells - those serving the employees of a business, the customers of a restau-

rant, the visitors to a rest area, or the students in a school. All eventually need to be included in the process of wellhead protection.

As a starting point, a local government should obtain from the Virginia Department of Health an inventory of all the different types of public wells found within the locality's borders. Local governments, along with well owners and customers, then need to come together to consider specific steps that they believe are both needed and acceptable. A committee process is recommended as a way of sharing information and building support among the diverse set of players involved with public water. This report is directed to all these stakeholders and provides specific steps for them to consider.

When Should the Process Begin?

It is safe to say that many citizens do not have any idea about the source of their drinking water before it reaches their tap. This is especially true of ground water sources that are literally "out of sight."

This is likely to change in the near future and local governments are much more likely to be called on "to do something" to protect the water supply than in the past. One reason is the 1996 Amendments to the federal Safe Drinking Water Act that create a number of new consumer involvement and right-to-know features.

One new feature is called the "Consumer Confidence Report." Beginning in late 1999, every community water system will be required to prepare this report annually and to notify customers of its results through the mail, newspaper notices or other means depending on the number of customers served.

The report will do several things. If any regulated contaminant is detected at any level in that water system, consumers must be told the level that has been detected; the federal maximum contaminant level; and for any detection that exceeds the federal level, the health concerns associated with this level. As described by EPA, "The report can be a tool that starts a dialogue between the consumer and their drinking water utilities, and one that gets consumers more involved in decisions which may affect their health" (Federal Register, February 13, 1998).

Another important feature of the 1996 amendments is a mandatory assessment of each source of public drinking water. In Virginia, these Source Water Assessments will be conducted by the Virginia Department of Health. This assessment process will get underway some time after February 1999 and will examine the susceptibility to potential contaminants of both surface and ground waters. Susceptibility is based on land use in the vicinity of public water supplies as well as soils, geology and other physical factors. It is likely that ground water systems will be addressed first since large surface water systems are more complex and will take longer to complete. A mandatory part of the source water assessment process is an outreach and public information component about the susceptibility of each source to potential contamination.

With these two new requirements, community awareness of ground water supplying public systems will dramatically increase. A likely outcome is a major increase in public concern about water supply and a desire to implement components of wellhead protection like those described in this report.

When should local government, well owners and customers get started? **NOW!** Now is a good time to

start assembling basic data about local systems serving the public, to begin informing potential participants about their systems, and to look to a future that includes wellhead protection. Though the Virginia Department of Health will be conducting source water assessments, it is up to local government, utilities, consumers and others to protect their public water supply sources. The state will help target problems but solutions involving land use management will be primarily local.

Inside the front cover of this report are other publications that may be of interest.

Chapter 1: Introduction

"Wellhead protection" is the term applied by the U.S. Environmental Protection Agency (EPA) and others to describe a process for assessing potential threats to ground water in areas near public water supply wells, for managing nearby land uses, and for planning to prevent ground water problems. A wellhead protection area consists of land delineated in the vicinity of a public water supply well chosen for special protection to prevent pollution of the ground water by nearby surface and sub-surface activities. Public water supply wells include community wells - both those owned by governments and those owned privately - serving residential customers. Public water supply wells also include a variety of non-community wells serving the public in locations such as schools and industries and the transient public in locations such as rest stops and restaurants.[1]

Wellhead protection is a process of:

- identifying the area's public water supply wells;
- assessing the potential risks around these wells, and;
- implementing measures to manage these risks.

This report addresses this third step, implementing measures to manage these risks. (For greater detail about other steps in wellhead protection, see Chapter 3 of *Wellhead Protection: A Handbook for Local Governments in Virginia*. See inside front cover to obtain this and other reports.)

Progress to Date in Virginia

Some two dozen localities in Virginia have, in recent years, embarked on one or more aspects of wellhead protection. Clarke County was a pioneer when, in 1983 it began to be concerned about growth and development occurring near the Prospect Hill Spring, a major source of drinking water for the communities of Boyce and Millwood. Other communities that have also become involved include Roanoke County, after a suspected carcinogen was found in a public water supply well serving a trailer

[1] The following definitions are part of the Virginia Department of Health – Waterworks Regulations.

"Waterworks" means a system that serves piped water for drinking or domestic use to (i) the public, (ii) at least 15 connections, or (iii) an average of 25 individuals for at least 60 days out of the year. The term "waterworks" shall include all structures, equipment and appurtenances used in the storage, collection, purification, treatment and distribution of pure water except the piping and fixtures inside the building where such water is delivered (see Article 2 of Chapter 1 of Title 32.1 of the Code of Virginia).

"Community water system" means a waterworks which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents.

"Noncommunity water system" means a waterworks that is not a community waterworks but operates at least 60 days out of the year.

"Nontransient noncommunity water system (NTNC)" means a waterworks that is not a community waterworks and that regularly serves at least 25 of the same persons over six months out of the year.

park near Interstate I-81. In Botetourt County, the Town of Fincastle became involved in wellhead protection after private wells in the town were contaminated as a result of a fire and numerous septic system failures. New town wells were needed and were drilled in surrounding Botetourt County, beyond Fincastle's own planning and zoning jurisdiction. Other communities in Virginia have also started various degrees of wellhead protection with the goal of preventing water supply problems.

Below is a list of Virginia communities known to have initiated some type of wellhead protection activity as of this writing. This is significant progress and represents important beginnings for wellhead protection.

1. Accomack/Northampton PDC
2. Appomattox, Town of
3. Augusta County PSA (14 systems)
4. Bedford County PSA (10 systems)
5. Buchanan
6. Carroll County PSA
7. Catawba Hospital
8. Central Shenandoah PDC
9. Craig County
10. Daleville Water, Inc.
11. Ferrum PSA
12. Fincastle, Town of
13. Floyd County PSA
14. Fluvanna County
15. Glasgow, Town of
16. James City County
17. King George County
18. Henrico County
19. Hillsville, Town of
20. Lancaster County
21. Monterey, Town of
22. Mt. Jackson/Lord Fairfax PDC
23. Narrows, Town of
24. Nelson County PSA/Thomas Jefferson PDC
25. New Kent County
26. New Market/Lord Fairfax PDC
27. Pulaski County
28. Roanoke County
29. Rural Retreat, Town of
30. Shenandoah, Town of
31. Stanley, Town of/Lord Fairfax PDC
32. Stephens City/Lord Fairfax PDC
33. Troutville, Town of
34. Urbanna, Town of
35. Waverly, Town of
36. Williamsburg Court Water, Inc.
37. Wythe County

Closer examination, however, reveals that most of these communities have not advanced beyond the point of completing basic studies. Very few communities in Virginia or elsewhere have progressed beyond a few initial steps. Full implementation of wellhead protection remains more a goal than a reality.

This report is intended to assist communities who have begun wellhead protection and who now need to move forward with implementation. This can be achieved by making wellhead protection an integral part of local planning, regulation, service provision and outreach activities. This report provides model text components for these activities with the hope that they will be utilized as templates.

Implementation: Getting Over the Next Hurdles

It is easy to recognize the need to protect a community's water supply. It is relatively easy and inexpensive to conduct the studies that are the initial steps of the wellhead protection process. **But**, when it comes to implementation of the results of such studies, momentum seems to slow, or even stop. Moving beyond studies raises a number of concerns that can become hurdles. Model text components of various implementation tools like those made available in this report can help in overcoming these hurdles in a number of ways.

Hurdle #1: Skepticism About The Problem

The limited implementation mentioned above suggests that many local decision-makers are not informed about wellhead protection or see little threat to their public water supplies. They themselves have not experienced the impact and expense of replacing a public water supply source or of retrofitting a current source with a treatment system and so these risks do not seem very real. Not seeing major risk, local leaders question the justification for preventive strategies.

The risk, however, is real as has been recently pointed out. "Troubled Waters" reads the headline (Washington Post, June 15, 1998) describing the problem of public water supply contamination faced by three towns in Loudoun County - Purcellville, Hamilton and Round Hill. The article notes that these towns are not unique, town wells in several other parts of Virginia have also detected contaminants.

In Round Hill, 550 residents have turned to drinking bottled water. The problem is believed to be related to gasoline leakage. Four wells drilled by developers have been impacted by contaminant levels two to four times EPA standards. These wells were to be put into service this year but town officials have refused to hook them up for public use. According to the article, "Lower levels have since been found in six municipal wells." One homeowner in Round Hill is quoted as saying, "I have three young daughters and the health of my family is my number one concern." This father purchased his home a month ago and now asks, "I want to know if my house is going to be worth anything in five years."

In Purcellville, the contaminant in the public water supply system is a degreaser and dry cleaning solvent found at levels that exceeds drinking water health standards. The Post article reports that state health officials have ordered that the town's water supply be either cleaned up and treated, or shut down.

Community leaders across Virginia have the option of getting a jump on problems like this and not letting themselves be skeptical in thinking that "it could never happen here." As discussed in the Preface above, the Consumer Confidence Report and the Source Water Assessment requirements of the 1996 Amendments to the Safe Drinking Water Act are likely to result in much more information becoming available to the consuming public and a desire on their part to become much more involved in discussing what should be done to protect public water supplies.

Hurdle #2: Uncertainty About the Benefits

Serving citizens, providing job opportunities, directing growth and providing high quality water are all beneficial goals. Maintaining property values is also highly valued as evidenced by the quotation above from the Round Hill resident. Business leaders too are concerned. One economic development official in Loudoun County is quoted as saying, "clearly the impact is there in terms of any developer who is looking at buying property and who will probably require some extensive water quality testing. And any individual who is looking at existing lots, I'm sure they will require the same sort of testing. At least, if it was me, I would." Testing, of course, tells only about current quality. It offers no assurance that conditions will not change as the community develops and new land uses are added near public water supply sources. Testing also may not reveal contaminants on or in the ground which have not yet reached the aquifer. While wellhead protection can not offer guarantees or eliminate past abuses, it can offer assurance that something is being done to protect water supplies today.

This report presents a range of wellhead protection options from "basic" to "immediate" to "advanced". This leaves to each community the discussion of benefits and how much risk there needs to be to justify different types of programs. Instead of a "yes" or "no" decision on implementing wellhead protection, the question might better be posed as a matter of "how" to conduct wellhead protection, taking into account the unavoidable uncertainty about risks and benefits. For decision-makers to be able to balance these uncertainties, they need a better understanding of what wellhead protection entails as provided by the model text components in this report.

Hurdle #3: Unpopularity of Regulations

Today there is a widespread concern about regulatory burdens. Those most concerned about regulations tend to imagine the worst when the possibility of new requirements is mentioned. Those favoring a more active regulatory role, on the other hand, are prone toward underestimating the burdens of new programs. If little is known about the actual content of a potential regulatory program, critics and supporters each imagine the worst and the best respectively. The ensuing debate can become quite unrealistic and polarized. The model texts provided here reduce the role of the imagination and can show what it means to implement wellhead protection measures. Also, by including model texts for non-regulatory, planning and educational approaches, communities can see that there are many approaches to wellhead protection. Some may be right for their community while other methods are not.

Hurdle #4: Reluctance About New Programs

With governments increasingly concerned with fiscal constraints, there is a wide recognition that staff and other resources must be used sparingly and new projects examined carefully. Model texts provide a basis for this careful examination and can show the type of program activity that can come from embarking on a wellhead protection process. Communities are understandably reluctant to start something when they are not sure where it will lead. With this report, they can look at the model components

and see more precisely what might lie ahead.

Model texts can address a number of concerns; they can show where studies might lead, they can show the nature of any additional regulatory burden, they can provide a measure of the social and political costs of assuring a community's water supply, and they can provide a possible language for an "extended warranty" in the form of wellhead protection for those wanting to locate and develop in the community. Put simply, model texts make it possible to "see what you get, before you buy".

Using Model Texts at the Local Level: A Tested Idea

Model texts have a long and respected history in planning. In the 1920's, Herbert Hoover, then Secretary of Commerce, publicized a model state zoning enabling statute that served as the basis for state after state to begin land use management. Between 1921 and 1923, more than 150 communities adopted zoning based on this model. Within a year of its publication, 15 states adopted state zoning acts.

The accomplishments of this model were substantial, notwithstanding the criticisms leveled against it. Some critics charged that states took the model too literally and did not adapt it to their own circumstances. Other critics charged that the model put zoning ahead of planning. Community after community adopted zoning, setting aside lands for commerce, industry and housing without having done the requisite studies or having adopted plans determining how much land was actually needed for these uses.

There have been other notable examples of model texts that proved useful to local governments including these in Virginia. One example is the model ordinance for a Chesapeake Bay Preservation Overlay District contained in the Local Assistance Manual of the Chesapeake Bay Local Assistance Department.

As with other model texts, a caution accompanies the present report. Communities in Virginia are urged to examine the model texts that are part of this report and then use them as a starting point. While it is possible to use these model texts "as is", it is hoped instead that they will serve as a launching pad for custom fitting provisions to each local situation. Communities should work closely with their attorney and be attentive to the concerns of property owners and citizens. No model can guarantee an absence of challenge. Laying of local political and legal ground work is essential.

The focus of this report is on implementation - specifically, implementation by local governments in Virginia. To test the idea that the model texts provided herein are likely to be workable in Virginia, a panel of individuals knowledgeable about ground water, public water supply, and local government in Virginia have reviewed this report as it was developed. While not endorsing any part of this report or having responsibility for its recommendations, the following individuals are acknowledged and are thanked for their time and thoughtful assistance.

Ken Coffman	Virginia Rural Water Association
Terry Harrington	Planning Director, Roanoke County
David Hirschman	Water Resources Manager, Albemarle County
Greg Kamptner	Assistant County Attorney, Albemarle County
Larry Land	Virginia Association of Counties
Doug Moseley	Central Shenandoah Planning District Commission
Jerry Peaks	Virginia Dept of Health, Div. of Water Supply Engineering
Terry Wagner & Mary Ann Massie	Virginia Department of Environmental Quality, Ground Water Program

This report has been prepared under the auspices of the Virginia Ground Water Protection Steering Committee by the Institute for Environmental Negotiation at the University of Virginia. A. Bruce Dotson is its senior author. Karen Firehock provided research and editorial assistance. Word processing was provided by Barbara Jones.

Plan of This Report

So that planning and implementation are addressed in their proper sequence, this report begins in Chapter 2 with planning and policy approaches. The long-range comprehensive plan is a community's most basic policy document and is considered first. Since many towns in Virginia have wells located outside their own jurisdiction in surrounding counties, a model resolution of interjurisdictional cooperation is presented next. The capital improvement program is a short term, typically five-year, plan that matches the community's spending to the phased implementation of its long range comprehensive plan. The last planning tool addressed in Chapter 2 is the emergency response plan addressing possible accidents that could impact water supply.

In Chapter 3, this report offers model text provisions for regulatory techniques. Zoning is the most basic of local regulations for wellhead protection because it addresses allowed uses in different parts of the community. Non-conforming uses, activities which existed prior to the current ordinance provisions are common in most jurisdictions and are addressed next. For uses allowed by zoning, their design and operation is addressed through performance standards and guidelines. Subdivision and site plan regulations deal with the design details of residential and other sites. Another type of regulation not yet in widespread use state-wide in Virginia is local septic tank requirements.

Chapter 4 deals with non-regulatory approaches. Acquisition of property and/or development rights can be highly effective for a variety of purposes. Use value taxation and Agricultural-Forestal (A-F) Districts are tools which can be specifically adapted for wellhead protection purposes.

Chapter 5 addresses the need for local leadership and oversight. A model job description is presented for a "Wellhead Protection Manager" position. This could be a new position or duties could be added to an existing position.

Model text components are in boxes and shaded to make them easily recognizable. State enabling legislation is summarized for each tool.

In recognition of the fact that local governments vary in their needs and capabilities, in several parts of this report model text provisions are offered at three levels: "Basic," "Intermediate" and "Advanced". The "Basic" level offers a good starting point for many communities. Others may prefer a more advanced level or may prefer to go beyond what is suggested in this report.

The model text components presented in this report assume that the community already has or will develop the basic tools in one form or another as part of their overall governance package. It is assumed, for instance, that a community has a comprehensive plan that is periodically reviewed. This report offers an "add on" component to add wellhead protection in their plan. A similar "add on" for wellhead protection is offered for zoning, for a capital improvement program and so forth. This report does not provide complete models for tools which a community does not already have in place. In that instance, the community should start by putting the basic tool in place first, either by developing it themselves, by following published guidance such as the Community Development series of reports[2] published by the Virginia Department of Housing and Community Development, and/or by working with their Planning District Commission staff.

This report ends with a bibliography citing useful additional sources of ideas and information.

2 This series of reports is now partially out of print. Those available include the Local Planning Commission, Zoning, the Language of Planning, and the Capital Improvement Program. These titles are available in limited quantities from DHCD (Ms. Shea Hollifield) at 804/371-7030. Many Planning District Commissions have copies of the full series in their libraries.

Source Water Note: From Wellheads to All Source Waters

In 1986, Congress amended the Safe Drinking Water Act to establish a federal "wellhead protection" program. This recently became the basis for a more inclusive program called "source water protection."

In 1996, Congress again amended the Safe Drinking Water Act. These amendments take the logic of wellhead protection and apply it, not just to ground water, but to all waters that are the sources for public water supply systems. Source waters include ground water, springs, and surface waters.

Under the recent amendments, states must submit plans to EPA describing how they intend to assess the susceptibility of their source waters to potential contamination. Each state must describe its methodology for source water assessment area delineation, its plan for completing inventories of potentially significant contamination sources and its approach for determining susceptibility. In carrying out its program, each state is to encourage the public to participate in developing protection programs for local source waters. Local governments in Virginia will want to take advantage of this opportunity to participate.

It is important to note that while each state must conduct source water assessments, protective actions to implement the findings of these assessments remain voluntary. This was no doubt a political compromise in getting the 1996 Amendments through Congress, but it leaves the difficult question of implementation to other levels of government, to citizens and to the private sector. To stimulate and facilitate the implementation process locally, reports such as this one can be helpful in bringing available tools to the attention of communities who need them.

While this report addresses itself mainly to ground water, the same tools are useful to protect surface source waters. Some parameters will vary depending on the type of source but the basic implementation tools are the same – the comprehensive plan, zoning, non-regulatory and educational efforts, etc. For this reason, the reader is encouraged to think more broadly than ground water. The reader is encouraged to consider all source waters regardless of type. Throughout this report, there will be sections inserted called "Source Water Notes" to call attention and offer suggestions about wider application to all source waters.

Notes on Chapter 1

- Notes about getting over the next hurdles.

- People to talk to about wellhead protection.

Chapter 2: Planning & Policy Approaches

Planning and policy approaches to wellhead protection precede the other tools in this report, both chronologically and logically. Chronologically the comprehensive plan provides the community agenda that other regulatory and non-regulatory tools are to carry out. Logically and legally, plans and policies provide a benchmark against which tools are measured for their reasonableness and consistency. This chapter addresses four types of plan and policy documents: the comprehensive plan, a memorandum of interjurisdictional cooperation, the capital improvement program, and the emergency operations plan.

The Comprehensive Plan

The comprehensive plan is the starting point for wellhead protection since this plan provides the foundation for all tools of land use management at the local level. It sets forth goals and policies to guide future land use and development of a community. In the event that a community's wellhead protection program is ever challenged, one of the best defenses is a well formulated and consistently implemented comprehensive plan that provides the basis and rationale for the challenged action.

Authority for the Comprehensive Plan in Virginia

Virginia law requires that counties, cities, and towns prepare comprehensive plans and review/update them at least every five years. Provisions were added to the Virginia code in 1988 and 1990 to state that jurisdictions shall study matters such as ground water and geology in preparing their plan and may subsequently adopt provisions to protect the ground water resource.

This section of the code reads as follows:

PLANNING, SUBDIVISION OF LAND AND ZONING -
ARTICLE 3:

The Comprehensive Plan

15.2-2223. The plan, with the accompanying maps, plats, charts, and descriptive matter, shall show the locality's long-range recommendations for the general development of the territory covered by the plan.
It may include, but need not be limited to:

1. The designation of areas for various types of public and private development and use, such as different kinds of residential, business, industrial, agricultural, mineral resources, conservation, recreation, public service, floodplain and drainage, and other areas;

2. The designation of a system of transportation facilities such as streets, roads, highways, parkways, railways, bridges, viaducts, waterways, airports, ports, terminals, and other like facilities;

3. The designation of a system of community service facilities such as parks, forests, schools, playgrounds, public buildings and institutions, hospitals, community centers, waterworks, sewage disposal or waste disposal areas, and the like;

4. The designation of historical areas and areas for urban renewal or other treatment.

5. The designation of areas for the implementation of reasonable ground water protection measures.

• • •

15.2-2224. Surveys and studies to be made in preparation of plan; implementation of plan. In the preparation of a comprehensive plan, the local planning commission shall survey and study such matters as the following: 1) Use of land, preservation of agricultural and forestal land, production of food and fiber, characteristics and conditions of existing development, trends of growth or changes, natural resources, historic areas, **ground water**, **surface water**, geologic factors, population factors, employment, environmental and economic factors, existing public facilities, drainage, flood control and flood damage prevention measures, transportation facilities, the need for affordable housing in both the locality and the planning district within which it is situated, and any other matters relating to the subject matter and general purposes of the comprehensive plan. . .

From these provisions, it is quite clear that local governments are expected to address ground water and areas for protection as part of their comprehensive plans. Why is the plan important? Why is it the starting point for implementation?

The Functions of a Comprehensive Plan

The comprehensive plan serves a number of purposes in community decision making for wellhead protection. Following each function are suggestions about wellhead protection.

1) Agenda Setting - the comprehensive plan establishes those topics that are the most significant for meeting community goals.

- *Ground water is literally out of sight and too frequently out of mind - the comprehensive plan should make ground water and wellhead protection an explicit part of the community's agenda.*
- *Protection of ground water supplying public wells should be linked to other important community goals (e.g., farm land protection or economic development) and to constitu encies most affected by ground water-based public water systems.*

2) Public Education - the comprehensive plan provides basic data and base line information as a way of improving community understanding.

- *The plan should include a map showing the number, location, and types of public water supply wells - this should not be limited to wells owned by local government but should include investor owned public systems.*
- *The uses and users of ground water-based systems should be identified in order to make clear the significance of ground water to the community.*
- *Other information can include a summary of authority for ground water protection, and the significance of the particular local hydrogeologic setting for ground water vulnerability.*

3) Forecasting - the comprehensive plan anticipates needs that will likely occur over the next 5-20 years and calls attention to likely shortfalls or other issues.

- *Growth and expansion projections should be translated into demands for ground water-based public supply systems.*
- *Costs and benefits should be compared for meeting anticipated demand through additional sources and through protecting and maintaining existing ground water sources.*

4) Establishing Goals, Objectives and Action Items - the comprehensive plan establishes broad community development and sustainability goals as well as more specific objectives and action items.

- *Ground water should be specifically mentioned at all three levels of detail - goals, objec tives and action items.*
- *Action items should span the range of planning tools - those based on regulation, taxes, services and acquisition as well as voluntary and educational measures.*
- *Specific responsibility should be assigned to an office, an individual, or a standing commit tee.*

5) Identifying Partners - the comprehensive plan addresses the entire community and should be "owned" by a variety of private as well as public individuals and organizations.

- *Where a well or the area contributing recharge to it lies beyond the boundary of the community, the locality having land use authority in the vicinity of the well should be identified.*
- *The operator/owner of each well/system should be identified. A contact person and 24-hour phone number should also be kept on file.*
- *Major landowners in the vicinity of each well should be noted for targeting outreach efforts and/or for notification about proposed protections.*
- *Those most involved with local economic development and residential subdivisions using ground water should also be noted for targeting outreach efforts.*

6) Tracking and Accountability - the comprehensive plan, through annual reviews and five-year updates, provides a means for charting progress and for revisiting directions and priorities.

- *Ground water and wellhead protection related actions should be reported, evaluated and revised on a schedule set by the community.*
- *Any change in overall vulnerability/susceptibility should be described and used as the basis for a new round of commitments.*
- *Long term trends should be extrapolated into the future to weigh overall sustainability.*

With these functions, it can easily be seen why the comprehensive plan is a critical element in implementing wellhead protection.

Model Text Components for a Comprehensive Plan

With these functions in mind, the following model text provisions are offered. The model, as has been stated, is focused on the protection of ground water which supports public water supplies. Communi-

ties may wish to expand these provisions to include all aspects of the ground water resource and/or to include surface waters by addressing the broad category of all source waters or to address all water resources. The purpose here, however, is to focus on ground water-based public water supply systems. **Note: Items in parentheses here and throughout this report are to be filled in to best fit the situation of the community. Other adjustments are also encouraged.**

Six elements are proposed. As explained below, a community can consider a basic, an intermediate, or an advanced approach.

I. *Introduction*

*Protection of ground water which supports public water supplies is of vital importance to (*community/name*). These public water supplies represent a substantial investment that would be extremely expensive, if not impossible, to replace if their source of water were to become polluted. While pollution is never an intended consequence, there are many normal, day-to-day activities that could have the unintended consequence of compromising our community's drinking water supply. Underground storage tanks, farming activities, industry and business, residences that rely on septic systems and transportation corridors are all activities that must be carefully managed when they are near and possibly in the recharge areas of public water supplies.*

II. *Potential Participants & Partners in Local Ground Water Protection*

Ground water protection needs to be a community effort where there are no "bad guys" and "good guys". It is in everyone's interest to protect ground water and each can play an important role

Water System Owners	*Major Water Users*	*Major Employers*
(fill in)	(fill in)	(fill in)

Major Public Facilities	*Transportation*	*Adjoining Jurisdictions/PDC*
(fill in)	(fill in)	(if applicable, fill in)

Partner state agencies which can provide technical support, data and, in some cases, grants include:

- *Department of Environmental Quality*
- *- Water Division*
- *- Waste Division*
- *Department of Health*
- *- Office of Environmental Health Services*
- *- Division of Water Supply Engineering*
- *Department of Housing & Community Development*
- *Department of Mines, Minerals & Energy*

- *Department of Agriculture & Consumer Services*
- *Department of Conservation & Recreation*
- *Cooperative Extension Service*
- *Department of General Services (Consolidated Laboratory)*
- *Chesapeake Bay Local Assistance Department*
- *Department of Business Assistance*

A number of non-governmental organizations can also be helpful. These include:

- *The Virginia Rural Water Association*
- *The Southeast Rural Community Assistance Project/Virginia Water Project*
- *The Ground Water Foundation*
- *The Ground Water Protection Council*

Federal agencies include:

- *The US Environmental Protection Agency*
- *The US Geological Survey*

Universities and community colleges: These can also provide useful information and assistance and become effective partners.

III. Goals, Objectives & Action Items

Goal: *To protect ground water which serves, or may serve in the future, as a source of public water supply. To protect it from the threat of contamination as a result of accidents or unwise practices from nearby residential, industrial, commercial, agricultural, waste management, or transportation activities. To cooperate with the Department of Health in carrying out the Safe Drinking Water Act purposes and provisions.*

Objective #1: *Establish a data base and system for acquiring, storing and displaying data about the community's public wells, their construction, on-going water quality monitoring data, hydrogeology, and development activity.*

Action Items:

a) *Contact the Virginia Department of Health to obtain updated information about the public water supply wells permitted by this agency and any source water protection assessment and activities this agency has underway.*
b) *Contact the Virginia Department of Mines, Minerals and Energy to obtain updated hydrogeologic information about the area associated with existing wells and about sites for potential future water supplies.*
c) *Contact the Virginia Department of Environmental Quality to learn about any new water quality or quantity information available for this*

community - follow-up any references they provide including federal and university sources.

d) *Planning, zoning and building departments will work together to track development occurring in the vicinity of public water supply wells.*
e) *Maintain a data base of state permits issued or proposed in designated wellhead protection areas.*

Objective #2: Increase public awareness of ground water, its uses, role and importance to the community. Involve the public in adopting ground water protection as a shared responsibility involving all segments of the community.

Action Items:

a) *Develop information pamphlets and distribute these as part of on-going citizen/customer contacts.*
b) *Develop partnership agreements with local schools and teachers to bring ground water education into the schools.*
c) *Establish a speakers bureau of local and state individuals and make this available to community groups.*
d) *Subscribe to publications and internet sites-e-mail lists featuring ground water.*
e) *Visit and discuss ground water with major facilities and land owners in the vicinity of public water supply wells.*

Objective #3: Complete all twelve steps of the wellhead protection process as identified by the Virginia Ground Water Protection Steering Committee in the next (fill in) *years.*

Action Items:

a) *Designate* (organization, office or individual) *as the project leader for this undertaking.*
b) *Establish a Wellhead Protection Advisory Committee consisting of* (organizations, offices, or individuals).
c) *Seek technical and/or grant writing assistance from the* (fill in name) *Planning District Commission.*
d) *Develop a detailed work plan for each of 12 steps not yet completed.*
e) *Develop funding options for a ground water source protection program.*
f) *Report your progress to the Planning Commission and elected officials on an* (fill in) *basis.*
g) *Develop an implementation strategy involving planning, regulatory and non-regulatory components.*

IV. *Ground Water Sources and Uses*

*(*Community*) is fortunate to have a number of public water supply sources that utilize ground water. As of* (year/date__) *the Virginia Department of Health lists the*

following systems as using ground water, each of which may be composed of one or more wells.

System Name	*Owner*	*Location of Wells*	*Current Withdrawal*	*Allowed Withdrawal*
(fill in)	(fill in)	(fill in)	(fill in)	(fill in)

(Comment: From this comprehensive list, a community may decide to begin implementation on a priority basis reflecting the number of customers served or other criteria.)

Map 1 below shows the location of each of the wells making up these systems.

Map 1

Map 2 identifies some of the current major users of this community water resource. These include major employers such as (fill in), commercial users such as (fill in), and residential users such as (fill in).

Map 2

V. *Forecasts of Ground Water Need*

Over the next twenty years, (community name) *is expected to grow and add an estimated* (fill in) *residents,* (fill in) *housing units and* (fill in) *jobs. It is expected that* (___%) *of this growth will take place in areas such as* (fill in) *that would best be served by public water supply systems utilizing ground water.*

This expectation can (or cannot) *be realized with currently available supplies. Existing supplies will play an important role in meeting future demand and thus protection of these resources from potential pollution is essential.*

VI. *Land Uses in the Vicinity of Public Water Supplies*

According to the Virginia Ground Water Protection Steering Committee, the following land uses can pose threats to ground water. This list is to serve as a cautionary guide not as an allegation of a problem.

Residential

Threats to ground water from residential uses are normally less acute on a case-by-case basis than those from other, more intensive, land uses. The cumulative effect from many residents in an area can prove to be a serious problem, however, especially if owners are unaware of the numerous potential contaminants that can be found in the home and yard and the proper methods for their use and disposal. Potential residential sources include:

- *on-site septic systems*
- *sewer lines*
- *fuel storage systems*
- *household, lawn, automotive, and pool chemicals*
- *storm water*
- *abandoned wells*

Industrial

Industrial operations commonly use toxic substances as part of manufacturing, warehousing, and/or distribution. Materials such as chemicals, petroleum, cleaning supplies, machinery, metals, electronic products, asphalt, and others pose a potential threat unless carefully managed. Activities representing the greatest concern include:

- *mining, quarrying*
- *pipelines*
- *storage tanks (above and underground)*
- *operating and abandoned wells (e.g., gas, oil, water, monitoring and exploration)*
- *septage and sludge lagoons*
- *land application of sludge*

Commercial

Many commercial operations use toxic and hazardous materials in their processes. The storage, use and disposal of chemicals required by these operations can pose a potential threat to ground water, since even small amounts of the hazardous materials can contaminant large amounts of ground water. Specific land uses of concern include:

- *auto repair shops, gas stations*
- *road maintenance depots, de-icing operations*
- *boat yards, railroad tracks and yards, airports*
- *construction areas*
- *dry cleaners, laundromats*
- *medical institutions, research laboratories*
- *photography establishments, printers*

Agricultural

Chemical usage associated with farming activities can present a contamination threat to underlying ground water. Pesticides, fungicides, and fertilizers can leach through the soil to the water below when applied improperly in the field. They also have the potential to leak from any storage containers into the ground. Animal feedlots and livestock operations can create excessive nitrate/nitrite and bacteriological problems if animal waste loads, either dry or liquid, are high and ground water is shallow or the soil is permeable. Specific concerns for farming include:

- *pesticides, fungicides*
- *fertilizers*

- *feedlots,Confined Animal Feeing Operations*

Waste Management

Disposal of wastes must be handled carefully to prevent contamination of ground water. Older landfills in particular can threaten ground water. In lined landfills, reliance is placed on the liner not failing after a number of years. The need to manage "waste" stormwater is created by most development - residential, commercial and industrial - since impervious surfaces prevent rain from soaking into the soil. Sites of greatest concern include:

- *landfills*
- *impervious surfaces*
- *basins, lagoons*

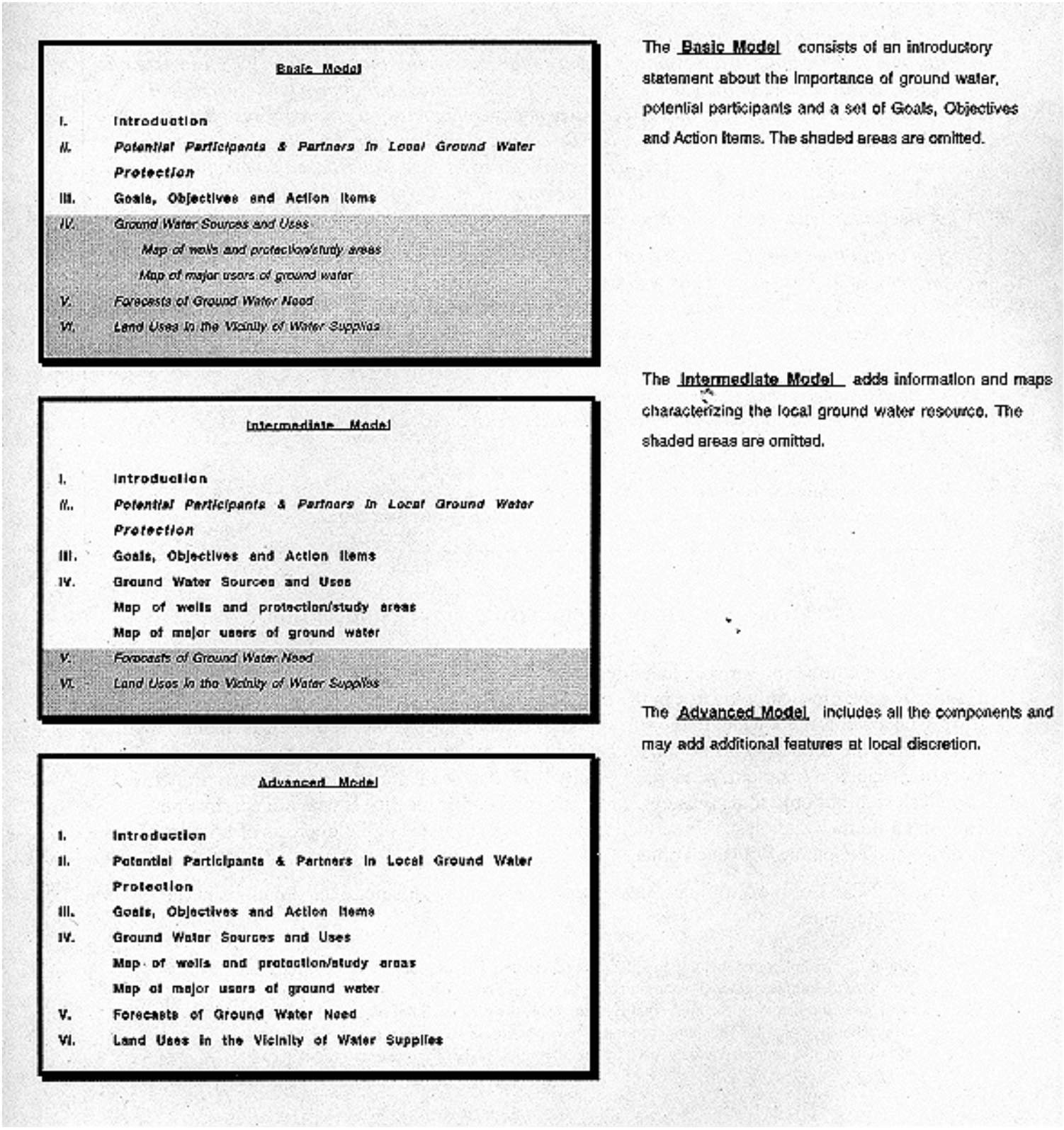
Transportation

Facilities moving potentially contaminating liquids or materials through an area can result in spills and accidents in locations near public water supplies. Preventing escape of such materials is crucial as is rapid response. Specific sources of concern include:

- *pipelines*
- *highways*
- *airports*
- *rail lines*

(If a survey of land uses in the vicinity of public water supply wells has been completed, findings should be presented here. Results can be as general or specific as the community desires - consideration should be given to maintaining a spirit of partnership rather than blame. If a survey has not been completed, doing so should be an action item under goals, objectives and action items.)

Figure 1: The Comprehensive Plan –
Basic, Intermediate, and Advanced Approaches



Source Water Note: The Comprehensive Plan

Ground water is an important source of water for many, especially rural, communities. Of the over 4,000 public water supply systems in the state, more than 3,700 or 93% use ground water for all or part of their drinking water. It is estimated that approximately 670,000 Virginians are served by ground water dependent community water supply systems - thus the importance of protecting this resource. By comparison, however, roughly eight times as many, or 5.6 million, Virginians are served by large surface water based community systems. Based on these numbers, it is clear that all sources, both ground and surface, deserve protection from potential pollution risks.

The comprehensive plan and the model text provisions suggested above can be readily adapted to address surface, as well as ground water sources. Section 15.2-2224 of the Virginia Code mentions both ground water and surface water. Sections of the comprehensive plan that can be modified to address surface water as well as ground water include:

- *the introduction and general statement of the issue of source water protection;*
- *the listing of major stakeholders and potential participants;*
- *goals, objectives and action items;*
- *the listing of water sources and maps locating these sources;*
- *water need forecasts and comparisons with existing supplies; and*
- *potential pollution sources survey in both wellhead and watershed areas.*

Memorandum of Interjurisdictional Cooperation

A significant number of Virginia localities are in a situation where wells that serve their community are physically located in the territory of an adjoining jurisdiction. Typically, it is a town whose wells are located in the surrounding county. Even if the well itself is in one's own jurisdiction, the zone of contribution to that well may include territory in another jurisdiction. Localities can also be interdependent. Locality A owns a well situated in locality B. Locality A supplies water not only to its own citizens, but to citizens of locality B who are nearby and convenient to the water system's service area. In each case, it is in the interests of both localities to assist and cooperate with each other.

Section 15.2-2231 of the Virginia code addresses such extra-jurisdictional situations in the following language.

> Any municipal plan may include the planning of adjacent unincorporated territory to the extent to which, in the municipal local planning commission's judgment, it is related to the planning of the incorporated territory of the municipality. However, the plan shall not be considered as a comprehensive plan for such unincorporated territory unless recommended by the county commission and approved and adopted by the governing body of the county.

To apply these provisions to the case of wellhead protection, the following model is offered. Since the model is brief, no distinction is made between basic, intermediate and advanced approaches.

Model Text for a Resolution of Interjurisdictional Cooperation

Whereas the (town, city, county of _____) owns and operates (a) public water supply well(s) physically located in the (town, city, county of _____);

Whereas the well site(s) owned by the (town, city, county of _____) consist of (____) acres;

Whereas the land area contributing recharge to their well is much larger than this well site;

Whereas land use planning and management of the area surrounding this site is (these sites are) under the jurisdiction of the (town, city, county of _____); and

Whereas it is in the mutual interest of (town, city, county of _____) and (town, city, county of _____) to see that the ground water serving as a source for this (these) well(s) is protected for current and future users and the benefit of the public generally,

Now, therefore, be it resolved that (town, city, county of _____) each agrees to:

- *Undertake steps to increase public awareness of ground water, its uses, role and importance;*
- *Distribute information pamphlets as part of on-going citizen/customer contacts;*
- *Encourage partnership agreements with area schools and teachers to bring ground water education into the schools;*
- *Designate a person to serve as the project leader for this undertaking;*
- *Develop a detailed work plan for each of the wellhead protection steps not yet completed, and;*
- *Report progress to the two Planning Commissions and elected officials on a (fill in) basis.*

Agreed to this day and year of (_____)

(town, city, county of _____) *(other town, city, county)*

Source Water Note: Interjurisdictional Cooperation

When consideration expands beyond ground water to surface water impoundments, the land area contributing to the public water supply system is likely to be quite large. A large area, in turn, is likely to include other jurisdictions. The watersheds of public water supply systems can be quite extensive and many citizens are unaware that they live, do business, farm or travel in someone else's water supply watershed. People generally are aware of the governmental jurisdiction in which they live because they pay taxes, send children to school, vote for representatives, etc., but few people are aware of their larger "ecological address". This presents a major challenge for source water protection which requires a new way of thinking.

The above model of a resolution of interjurisdictional cooperation can be expanded to protect a whole watershed and can be used as a starting point to educate people about their ecological address.

Capital Improvement Program (CIP)

A Capital Improvement Program (CIP) is a report prepared by a community to identify and prioritize its five year needs for infrastructure, equipment and services as called for in its comprehensive plan. Provision of water and protection of the sources of that water supply are functions that should be explicitly addressed in the community's Capital Improvement Program. While the optional CIP is less widely adopted by localities in Virginia than the mandatory comprehensive plan, there is much about the CIP process to recommend it. It is good "business" practice as a money and asset management tool. The CIP also adds to the local portfolio of wellhead protection tools - not only are regulations being used to guide private action but the government is using its own funds to get its "own house" in order. Through the CIP, the burdens as well as the benefits, of wellhead protection can be shared.

Authority for the Capital Improvement Program in Virginia

Virginia law establishes the following framework for the Capital Improvement Program and assigns lead responsibility to the Planning Commission. Section 15.1-2239 reads as follows:

> A local planning commission may, and at the direction of the governing body shall prepare and revise annually a capital improvement program based on the comprehensive plan of the locality for a period not to exceed the ensuing five years. The commission shall submit the program annually to the governing body or to the chief administrative officer or other official charged with preparation of the budget for the locality, at such time as it or he shall direct. The capital improvement program shall include the commission's recommendations, and estimates of cost of the facilities and the means of financing them, to be undertaken in the ensuing fiscal year and in a period not to exceed the next four years, as the basis of the capital

budget for the locality. In the preparation of its capital budget recommendations, the commission shall consult with the chief administrative officer or other executive head of the government of the locality, the heads of departments and interested citizens and organizations and shall hold such public hearings as it deems necessary.

A CIP typically contains a statement of purpose. This should be modified to give explicit recognition to ground water sources of public water supplies. Because ground water is out of sight and out of mind, this means that its continued availability is taken for granted by many local citizens. A statement of purpose can serve as a reminder that ground water protection needs to be addressed along with other community needs. Each community should adopt its statement of purpose appropriately. Language can be borrowed from the model text for the comprehensive plan presented earlier.

CIP's are typically prepared through a committee process. Unlike some community activities (e.g., Little League, soccer, parents of school children), ground water does not usually have an organized constituency to advocate its cause. The CIP committee might be modified to include at least one person who is charged with representing ground water interests. If a wellhead protection manager has been designated as recommended in Chapter 5, this individual would be a logical member of the CIP committee.

CIP priorities typically reflect a number of considerations. Ground water is somewhat unique, however, and suggests additional considerations. The bottom line in ground water protection is that ground water sources are not easily replaced and there may be few alternative sources. Cost avoidance and an uninterrupted water supply are important objectives needing consideration among a community's top priorities.

Model Check List for Wellhead Protection Projects

The following projects have been considered, evaluated and a determination made that there is or is not a need for a capital improvement expenditure to address each need.

	Needed	*Not Needed*
• *Conduct studies leading to physical wellhead protection projects*		
-well site mapping and data base		
-technical delineation of protection areas		
-develop code sections for wellhead protection		
• *Add storage or pump capacity at existing well sites*		
• *Purchase, drill, equip additional well sites*		
• *Extend service lines to growth areas ("smart growth")*		
• *Provide sewer service instead of septic systems*		
• *Purchase computers/software for program administration*		
• *Add administrative office space/equipment*		

- *Improve ground water protection measures at the following public facilities:*
  - *vehicle storage/maintenance areas*
  - *solid waste landfills/collection points*
  - *seal/close wells no longer needed*
  - *upgrade storage tanks at all public facilities*
  - *upgrade/replace septic systems at all public facilities*
- *Purchase land for low impact public uses with secondary wellhead protection benefits*
- *Remediate lands purchased for redevelopment*
- *Purchase additional lands to buffer a wellhead*
- *Participate in cost sharing/matching funds projects*

The Virginia Department of Health (VDH) loan program, described in Figure 2, is a potential source of funding for the types of projects described above as well as those related to surface waters serving as sources to public water supplies.

Figure 2: Incentive-Based Protection Measures Loan Program

The 1996 Amendments of the SWDA promote non-regulatory solutions for source protection measures to achieve a goal of insuring safe and reliable water to consumers.

VDH proposes to utilize a portion of the Set-Aside monies to provide assistance to a waterworks, in the form of a loan, to implement voluntary incentive-based source water protection measures.

An incentive-based protection measure offers the benefit of source water protection to the applicant and an incentive to local participants.

Criteria for loan eligibility:

Applicant must be a Community Waterworks.

Programs and measures must be implemented within a delineated source water protection area.

Project must identify that it will facilitate compliance with primary drinking water standards or otherwise further health protection objectives of the SDWA.

Participation in programs must be voluntary.

Programs must identify incentives for local participants.

Types of projects include:

Creating a local fund to retrofit existing stormwater management facilities.

Creating a local fund to install bulk storage facilities containment devices.

Funding the development of a local source water protection ordinance.

Creating a local outreach program to reduce citizen use of fertilizers.

Creating local tree planting programs.

Creating local emergency spill response capabilities.

Loan repayments will be handled in accordance with Drinking Water State Revolving Fund loan repayment procedures.

A Priority Ranking/Scoring System will be employed to rank loan applications.

For additional information on this program, please contact:

Virginia Department of Health
Division of Water Supply Engineering
Thomas B. Gray, P.E.
(804) 786-1087

Emergency Response Plan

The underlying philosophy of wellhead protection is one of prevention - yet accidents do happen, facilities do fail and human error cannot be altogether avoided. Nobody wants to read a headline like the following but such situations do occur.

Derailment Took Officials by Surprise

LYNCHBURG – The city was given no warning when an out-of-control decoupled train loaded with chemicals was rolling toward the heart of downtown last week, officials said.

"I'm not aware of any notice that the city received prior to the accident," said City Manager Charles Church.

Barry Martin, who runs the city's 911 center, said he, too, was unaware of any advance warning.

Norfolk Southern officials would not say whether they attempted to notify the city. Spokeswoman Susan Terpay said there is a list of calls that are to be made in an emergency, but she would not comment on this wreck while it is being investigated by the National Transportation Safety Board.

NTSB investigator Russell Gober is expected to take up to six months to complete his investigation.

The 65-car train rolled down three miles of downhill track without a locomotive, picking up speed until it hit a 61-car train parked about 1 1/2 miles from the center of downtown. Emergency workers estimated that the train was traveling between 5 and 10 mph when it crashed.

Most of the 10 derailed cars flipped and landed on one another; some caught fire, sending a thick cloud of smoke billowing skyward.

Authorities evacuated a 50-block area of the city and an elementary school because one of the burning rail cars contained acetone, a colorless, flammable solvent widely used to remove paint, varnish and fingernail polish. Acetone produces poisonous fumes when burned.

It took about 35 firefighters to extinguish the blaze. Thousands of gallons of acetone and diesel from the locomotives burned for nearly four hours after the accident, producing a column of black smoke visible for miles.

Lynchburg Policy Chief Charles Bennett said the thick smoke from the fire caused no serious problems. The intensely hot fire may have burned off the toxins before they left the railroad yard, Bennett said. Evacuees were allowed to return to their homes about 9:30 p.m.

Associated Press

Fortunately, serious damage was averted, in part due to authorities being prepared and evacuating a significant section of the city and an elementary school.

Most localities are probably alert to the need to contain spills before they reach visible streams and rivers but how many are aware of public water supplies based on invisible ground water sources. A recently overheard radio exchange between law enforcement officials working the scene of a tank truck accident, went something like this. "It is a bad one. It is leaking in several places and there is a lot of spilled fuel." The base station replied, "Are there any water supplies nearby?" The response came back, "I don't think so. I don't see any streams right around here. Will confirm and get back to you." This is probably a representative exchange – the problem is that wellhead protection areas and public

well sites are not easily observable. They are important, however, and their location needs to become better known to local and state emergency officials.

Authority for Emergency Planning & Response in Virginia

The Virginia Code establishes the legal basis for emergency planning and response in the Commonwealth.

§ 44-146.19

Powers and duties of political subdivisions:

A. Each political subdivision within the Commonwealth shall be within the jurisdiction of and served by the Department of Emergency Services and be responsible for local disaster preparedness and coordination of response. Each political subdivision may maintain, in accordance with state emergency preparedness plans and programs, an agency of emergency services which, except as otherwise provided under this chapter, has jurisdiction over and services the entire political subdivision.

B. Each political subdivision shall have a director of emergency services . . .

E. Each local and interjurisdictional agency shall prepare and keep current a local or interjurisdictional emergency operations plan for its area. The plan shall include, but not be limited to, responsibilities of all local agencies and shall establish a chain of command.

§ 44-146.20

Joint action by political subdivisions:

If two or more adjoining political subdivisions find that disaster operation plans and programs would be better served by interjurisdictional arrangements in planning for, preventing, or responding to disaster in that area, then direct steps may be taken as necessary, including creation of an interjurisdictional relationship, a joint emergency services operations plan, mutual aid, or such other activities as necessary for planning and services. A determination of such findings shall be based on the factors related to the difficulty of providing emergency services on an individual basis.

§ 44-146.24

Cooperation of public agencies

In carrying out the provisions of the chapter, the Governor, the heads of state agencies, the local directors and governing bodies of the political subdivisions of the Commonwealth are directed to utilize the services, equipment, supplies and facilities of existing departments, offices, and agencies of the Commonwealth and the political subdivisions thereof to the maximum extent practicable. The officers and personnel of all such departments, offices, and agencies are directed to cooperate with and extend such services and facilities to the Governor and to the State Department of Emergency Services upon request.

Model Text Provisions for Emergency Response

As the sections of the Code of Virginia quoted above emphasized, cooperation of public agencies and joint action by political subdivisions are important elements in addressing emergencies quickly and effectively. A great deal of attention is paid, therefore, in emergency operation plans to who does what. The first "add-on" model text below addresses roles and responsibilities relative to public water supplies based on ground water.

Hazard identification and characterization is a second common element in emergency operations planning documents. Many of these hazards are at fixed sites – industries, agricultural supply stores, treatment plants, or storage facilities, for instance. An example of a hazardous materials facility data sheet is provided which provides space for adding associated risk facilities involving source water protection sites.

The third model component is an example of a map showing a hazardous facility and the potential receptor sites, also known as associated risk facilities, in its vicinity. In the example only an elementary school (designated B23 on Figure 4) has been identified as a receptor site. The model adds public water supply sources, in this case a surface water source, the Totier Creek Reservoir, to the map notation. If there were a public water supply well and an associated wellhead protection area, that, too, should be added.

a) Roles and Responsibilities

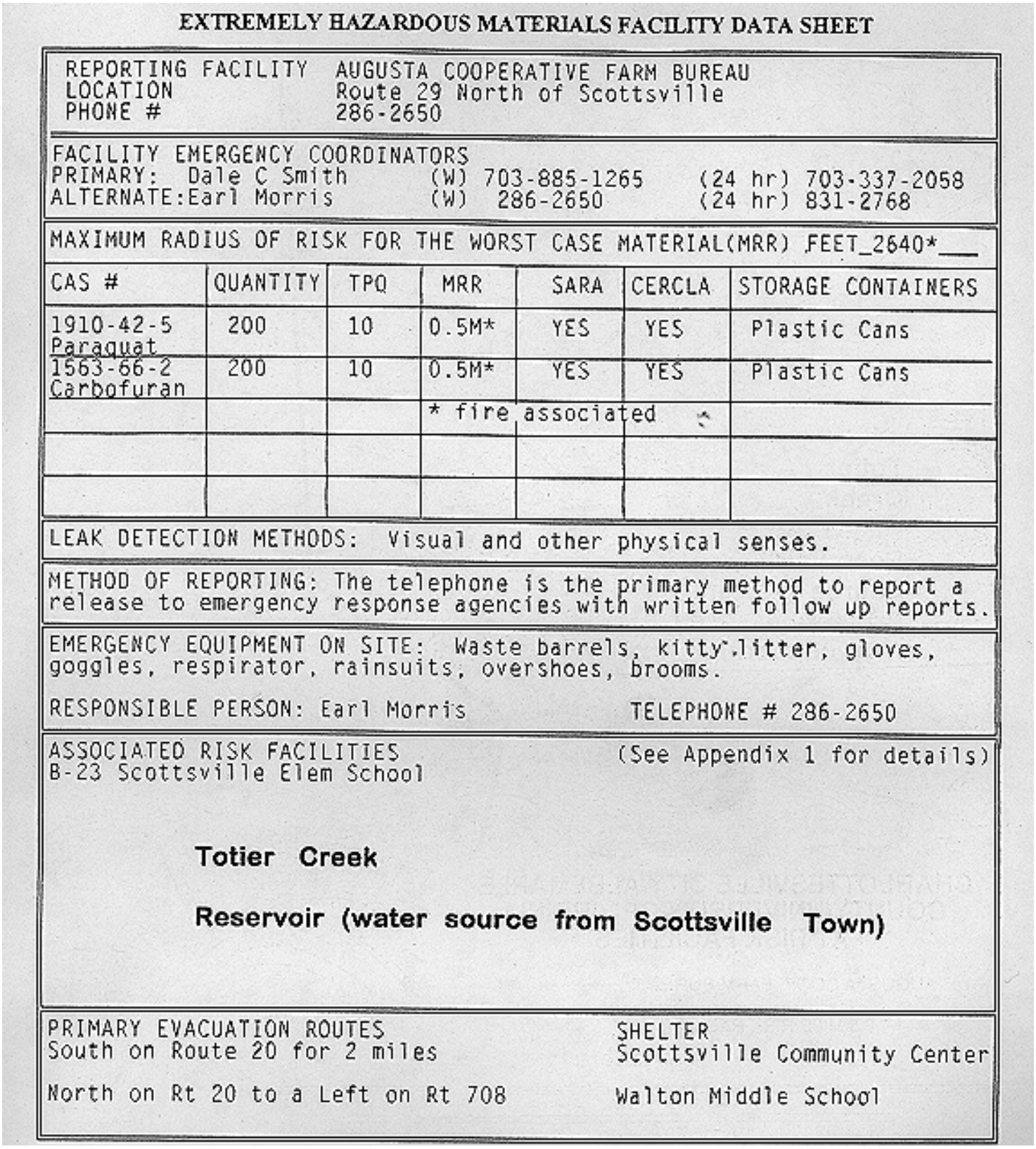
The (Wellhead Protection Manager [see Chapter5] or other locally designated person) has responsibility for the following duties in preventing, mitigating and responding to situations which potentially threaten public water supplies based on ground water sources:

1) *participate in preparation of the emergency operations plan;*
2) *provide information about the location, physical characteristics and equipment at each ground water based public water supply;*
3) *identify a 24 hour- 7 day contact person and phone number for each public water supply system based on ground water sources;*
4) *provide maps indicating the location of each public water supply well and any area zoned or designated as a Wellhead Protection Area;*
5) *assist the owners of a public water supply systems and emergency response personnel in notifying customers of the existence of potential risks; and*
6) *assist water supply owners in arranging for alternate water sources if this should prove necessary.*

b) Hazardous Materials Facility/Data Sheet (Example) (Figure 3)

c) Associate Risk Facility Map(Example) (Figure 4)

Figure 3: Hazardous Materials Facility Data Sheet (under Associated Risks, public water supplies should be listed)



EXTREMELY HAZARDOUS MATERIALS FACILITY DATA SHEET

REPORTING FACILITY AUGUSTA COOPERATIVE FARM BUREAU
LOCATION Route 29 North of Scottsville
PHONE # 286-2650

FACILITY EMERGENCY COORDINATORS
PRIMARY: Dale C Smith (W) 703-885-1265 (24 hr) 703-337-2058
ALTERNATE: Earl Morris (W) 286-2650 (24 hr) 831-2768

MAXIMUM RADIUS OF RISK FOR THE WORST CASE MATERIAL(MRR) FEET 2640*

CAS #	QUANTITY	TPQ	MRR	SARA	CERCLA	STORAGE CONTAINERS
1910-42-5 Paraquat	200	10	0.5M*	YES	YES	Plastic Cans
1563-66-2 Carbofuran	200	10	0.5M*	YES	YES	Plastic Cans
			* fire associated			

LEAK DETECTION METHODS: Visual and other physical senses.

METHOD OF REPORTING: The telephone is the primary method to report a release to emergency response agencies with written follow up reports.

EMERGENCY EQUIPMENT ON SITE: Waste barrels, kitty litter, gloves, goggles, respirator, rainsuits, overshoes, brooms.

RESPONSIBLE PERSON: Earl Morris TELEPHONE # 286-2650

ASSOCIATED RISK FACILITIES (See Appendix 1 for details)
B-23 Scottsville Elem School

Totier Creek

Reservoir (water source from Scottsville Town)

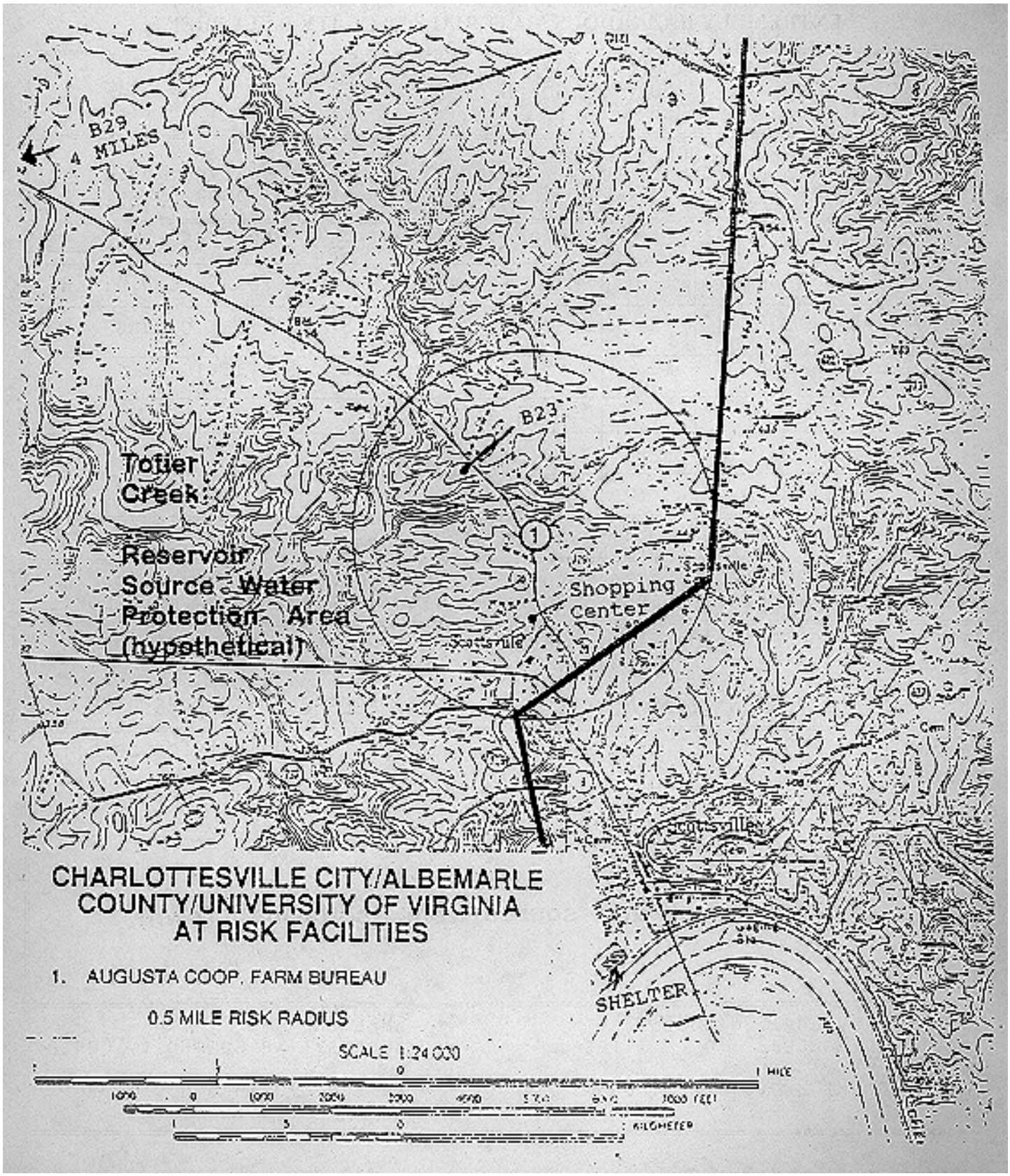
PRIMARY EVACUATION ROUTES
South on Route 20 for 2 miles

North on Rt 20 to a Left on Rt 708

SHELTER
Scottsville Community Center

Walton Middle School

Figure 4: Associated Risks Map (wellhead protection areas or source water protection area should be delineated and shown)



Source Water Note: Emergency Response Plan

The intent of the proposed model above is to make certain that all source waters are known to emergency personnel. Rapid response is especially important for surface waters because contaminants can move relatively quickly on the surface and through tributaries to a reservoir. Dilution will take place where the quantity of water is large but damage may have already occurred. Time of travel to ground water sources is long compared to surface waters. In ground water, there may be less dilution and contaminants could remain in the soil for years unless quick response prevents infiltration. While surface and ground water sources have these and other distinct characteristics, the need to identify both as part of an emergency response plan is similar.

Notes on Chapter 2

- Notes about amending the Comprehensive Plan.

- Notes about other jurisdictions.

- Notes about potential CIP projects.

- Notes about emergency response plans.

Chapter 3: Regulatory Techniques

Regulatory techniques - zoning, subdivision ordinances, site plan review and local septic tank requirements - are important parts of the tool kit for implementing wellhead protection. The advantages of regulatory approaches are that they:

- compliment public projects by addressing private property and private actions;
- are enforceable if voluntary compliance is not effective; and
- provide a level playing field for dealing with similar properties and activities in the vicinity of public water supply wells.

Notwithstanding the "tough sell" challenge posed by adopting new regulations, a wellhead protection program without a regulatory component cannot be considered fully implemented. If, for instance, a locality seeks a waiver of monitoring requirements from the Virginia Department of Health, zoning protections could be a key factor in meeting the standard that "the waterworks must demonstrate it is not susceptible to contamination from nearby sources" (Waiver Procedures and Criteria, Virginia Department of Health, September 1, 1994).

Zoning

Since zoning controls land uses, placement of building, and conditions the use of land and since land uses in the vicinity of public water supply wells can pose potential threats to these wells, zoning is an important tool.

In addition to the advantages of regulatory approaches in general, zoning has its own strengths.

- simplicity: zoning can be as basic as a map delineating a protection area and a list of allowed and prohibited uses in that area;

- flexibility: zoning is amenable to change for reasons such as additional hydrogeologic information or a well being abandoned, and;

- administrative ease: communities with zoning can add wellhead protection to the ordinance they already have in place.

Zoning, it should be added, is best used in conjunction with other tools and consistency among various tools lends credibility if there are challenges. Zoning addresses minimum standards for development of private property, which is the vast majority of land in a community. The Capital Improvement Program (CIP) applies to locally owned public property. Together they form a complete picture with both private and public ownership components included. Both combine with education and outreach efforts to encourage citizens to be good stewards of ground water resources. The interjurisdictional agreement presented in Chapter 2 addresses zoning by a neighboring jurisdiction. Together these and other tools can better achieve wellhead protection than can any one tool alone.

Authority for Zoning in Virginia

In 1988 and 1990, the General Assembly modified the comprehensive plan legislation to address ground water. At the same time, the state code was modified to allow localities to use zoning to protect water resources. The language of the pertinent zoning code section reads as follows:

§ 15.2-2283

Purpose of Zoning Ordinances

Zoning ordinances shall be for the general purpose of promoting the health, safety or general welfare of the public and of further accomplishing the objectives of § 15.2-2200. To these ends, such ordinances shall be designed to give reasonable consideration to each of the following purposes, where applicable: (i) to provide for adequate light, air, convenience of access, and safety from fire, flood, crime and other dangers; (ii) to reduce or prevent congestion in the public streets; (iii) to facilitate the creation of a convenient, attractive and harmonious community; (iv) to facilitate the provision of adequate police and fire protection, disaster evacuation, civil defense, transportation, water, sewerage, flood protection, schools, parks, forests, playgrounds, recreational facilities, airports and other public requirements; (v) to protect against destruction of or encroachment upon historic areas; (vi) to protect against one or more of the following: overcrowding of land, undue density of population in relation to the community facilities existing or available, obstruction of light and air, danger and congestion in travel and transportation, or loss of life, health, or property from fire, flood, panic or other dangers; (vii) to encourage economic development activities that provide desirable employment and enlarge the tax base; (viii) to provide for the preservation of agricultural and forestal lands and other lands of significance for the protection of the natural environment; (ix) to protect approach slopes and other safety areas of licensed airports, including United States government and military air facilities; and (x) to promote the creation and preservation of affordable housing suitable for meeting the current and future needs of the locality as well as a reasonable proportion of the current and future needs of the planning district within which the locality is situated. **Such ordinance may also include reasonable provisions, not inconsistent with applicable state water quality standards, to protect surface water and ground water as defined in §62.1-255.**

Model Text Provisions for Zoning

As indicated in Chapter 1, the assumption in this report is that a local government already has a zoning ordinance in place or will be developing one. What is offered below is an "add-on" or amendment to that ordinance for purposes of wellhead protection. Careful crafting to meet local needs and attitudes is strongly advised.

Rather than a unique zoning district for wellhead protection, the approach recommended is that of an overlay district. Overlay districts are used throughout Virginia for a variety of purposes, for instance, airport approach zones, entrance corridors, reservoir protection, and other special areas. The advantage of the overlay approach is that it minimizes changes to the existing zoning map by focusing on additional provisions necessary to the specific purpose of the overlay. It combines with any existing

zoning district - rural, residential or industrial - and can sometimes achieve community acceptance more readily than a distinct zoning district. Such changes to the text of the zoning ordinance do have impact, however, and need to be refined thoughtfully.

This model zoning ordinance amendment will begin with a statement of purpose and a definition of a public water supply well.

a) Purpose: Wellhead Protection Overlay District

The purpose of the Wellhead Protection (WHP) Overlay District is to prevent contamination of wells, wellfields, and other ground water resources that are used as elements of public water systems and that serve as sources of public drinking water for residences, businesses, schools, and sites open to the general public. These regulations promote the health, safety, and general welfare of the community by protecting the public and its drinking water from potential contamination of the ground water by nearby land uses and activities. These provisions are consistent with the 1996 Amendments to the Safe Drinking Water Act and programs of the Commonwealth of Virginia.

b) Definition

Public water system is a system for the provision of water for human consumption through pipes or other constructed conveyances if such system has at least fifteen service connections or regularly serves at least twenty-five individuals.

The WHP Overlay District must be delineated on the community's official zoning map. A simple textual reference to the map is made part of the ordinance. In drawing the map, there are several options. The most basic approach is what is termed the "fixed radius" approach. This approach is one that a community might use as a beginning. In the model text below a fixed radius of 1,000 feet is used. This is consistent with the radius being used by the Virginia Department of Health in conducting its source water assessments around public water supply wells.

Communities desiring to know more about protection area delineation alternatives should consult Chapter 5 of *Wellhead Protection: A Handbook for Local Governments in Virginia* (see inside front cover for ordering information). Each method has its own characteristics, advantages and disadvantages. In order of technical complexity, these alternatives are:

- fixed radius (recommended here as the starting point with a radius of 1,000 ft.);
- calculated fixed radius (the size of the radius varies by factors such as the pumping rate of the well, and the permeability and hydraulic conductivity of the bedrock);
- variable shapes (based on technical studies at case study sites, protection area shapes are designed that can be used at hydrogeologically similar sites);
- analytic models (site by site hydrogeologic studies generate protection areas for each site - most are elliptical or fan shaped rather than circular);

- numerical flow and transport models (computer simulation of zones of transport and contribution generate protection areas with complex shapes);
- hydrogeologic mapping (flow boundaries such as ridges, rivers, canals and lakes are
- mapped and used to delineate wellhead protection areas similar to a watershed -
- where ground water and surface water have a close connection, this method is especially useful).

Communities should keep in mind that there is no perfect wellhead protection area. Rather, a balance is needed between policy and technical considerations. Thinking should be strategic and supportable in the specific local context. The locality's attorney should stay alert to any court cases which might help interpret legislative actions. Localities considering wellhead protection for the first time often place priority on getting started over technical refinements. Once a start is made and some experience is gained, they may, at a later date, refine the protection areas. It may be better to get some tools in place in the immediate vicinity of the well than to delay, while refinements to the boundary of the zone are more precisely studied. Smaller communities with less technical staff or financial resources will also favor some of the more basic approaches.

The ability of a delineation method to incorporate different hydrogeologic settings and physical factors has another important side in addition to costs - that is, defensibility. The more restrictive the regulation, the more substantial must be the relation between the objective of protecting the public drinking water and the area delineated. All zoning decisions, of course, need to be defensible in certain ways (e.g., they are for a legitimate public purpose, the means must bear a relation to the ends, etc.). No calculation, however, can determine a zoning policy or boundary. How often, for instance, can a strictly technical basis be provided for a height limit of 35 feet (why not 36?); or a density of 10 units per acre (why not 9 or 11?); or 100 acres set aside for industry (rather than 90 or 110?). The point is that all zoning decision are judgment calls. To the extent that a community has the ability to use some of the more complex methods, they can better defend their judgment.

Depending on the number and type of public water supply wells in a community, it may not be possible to implement wellhead protection at all sites simultaneously even though this would be desirable. In such instances, a priority schedule can be established taking into account factors such as the availability of alternative supplies, number of customers and land use patterns.
The following model text can be used to refer to the zoning map upon which areas have been delineated.

c) Zoning Map

The governing body of (town, city, county) hereby establishes and delineates on the Official Zoning Maps the Wellhead Protection Overlay District, to be referred to on the Official Zoning Maps by the symbol WHP. Unless otherwise shown, the area delineated on the Official Zoning Maps consists of all lands within one thousand (1000) feet of each public water supply well. This initial area may be amended by the governing body if new information allows the community to better achieve the purposes of this ordinance.

In mapping wellhead protection areas, great variation in land use patterns can be anticipated. Town wells, for instance, that may have been isolated when originally installed may today be surrounded by development, possibly right up to the edge of the well parcel itself. Without having had the benefit of early wellhead protection, many wells are today in less than ideal situations.

At the time that the Wellhead Protection district becomes effective, existing uses must be addressed. It is not generally possible in zoning to apply provisions retroactively to established uses and structures, but expansions and new uses can be covered by ordinance amendments and invoke various performance standards and guidelines.

In its existing zoning ordinance, a community will have already addressed pre-existing non-conforming uses' generally. This section of the local ordinance should be re-examined with the health and drinking water purpose of wellhead protections in mind. Permissive non-conforming use provisions may be acceptable when the issue is the number of required parking spaces or a landscape buffer/visual screening requirement, but a stricter approach may be needed when a possibly irreplaceable public water supply is involved. The following model text is proposed.

d) Existing Uses & Structures

The use provisions of this article shall apply to structures constructed and land uses established after(date). Pre-existing uses that are no longer permitted may be continued but not expanded. The performance standards and guideline provisions of this article shall apply when additional development of a parcel is proposed. Performance standards and guidelines will at that time be applied to both existing and proposed development.

The following list of permitted and prohibited uses should be viewed as a checklist or starting point. Each community will have its own discussions about what uses to allow, what uses to prohibit, what uses to allow as a special exception or what uses to allow as long as certain standards are met. The land uses listed in the model below are all land uses that have been identified by various sources as potential concerns when near public water supply sources. In this model it is assumed that a 1,000 foot radius has been delineated. With this rather small protection area, fairly strict prohibitions are appropriate. If one-half mile or other larger area were protected, some of the listed uses might be treated as special exceptions for use permit consideration rather than strict prohibition. Some communities have developed zoning based on several tiers. In a primary protection tier - corresponding roughly to the 1000 foot radius proposed here - a number of land uses are prohibited. In a secondary protection tier surrounding the primary area, certain uses prohibited in the primary area are allowed by special exception when they meet performance standards and guidelines. In the third tier, the drainage area contributing surface runoff to the WHP, performance standards are employed rather than use prohibitions. In areas of karst geology, this third tier can be especially significant since surface and ground water can be closely associated. A multi-tiered zoning ordinance would be considered an advanced approach to wellhead protection.

The following model text assumes a single tier 1000 foot protection area.

e) Permitted Uses

The uses permitted in the Wellhead Protection Overlay District shall be the same as those permitted in the underlying zoning district except as specified below.

The following use types and uses shall be prohibited within the Wellhead Protection Overlay District:

(1) Airports
(2) Asphalt mixing plants
(3) Automobile repair services, major
(4) Automobile repair services, minor
(5) Central sewerage systems serving three or more connections discharging to drainfields
(6) Chemical, plastics, fertilizer, pesticide manufacture, processing or bulk storage
(7) Commercial feedlots, unless exempted under Virginia Code Section 15.2-2288
(8) Contractor's equipment storage and maintenance facilities
(9) Dry cleaning plants
(10) Gasoline service stations
(11) Golf courses
(12) Inoperative motor vehicles or inoperative motorized equipment
(13) Land application of industrial wastes
(14) Landfill, Construction Debris
(15) Landfill, Sanitary
(16) Outdoor, uncovered stockpiling of road salt or other deicing chemicals
(17) Petroleum, gasoline, or gas bulk storage or distribution
(18) Resource extraction
(19) Scrap and salvage yards or services
(20) Slaughterhouses
(21) Towing and storage of motor vehicles
(22) Underground storage of any chemical or petroleum products

If the community is uncertain about prohibiting any of these uses, certain ones might be allowed by use permit as special exceptions. This gives the community flexibility to judge each case on its own merits rather than declaring a blanket prohibition or a blanket approval. Warehousing is an example because the impact of the warehouse could be dependent on the nature of what is stored, how it is stored and how it as transported to and from the site.

Another advantage of a special exception approach is that it gives the community a period of learning. If the experience of several years shows that use permits are being granted routinely, then an ordinance change may be needed to make the use a regularly permitted use. If experience shows that certain conditions are imposed each time an application is presented, perhaps these conditions should be made regular performance standards. Experience can also confirm the benefits of looking at each case individually. The point is that ordinance provisions, once adopted, should be monitored and revised.

f)Special Exceptions

The following use types and uses shall be prohibited unless allowed by a special use permit approved by the governing body.

(1) warehousing
(2) (to be filled in)
(3) (to be filled in)

In addition to addressing prohibited and special exception uses, performance standards and guidelines can be an important tool for wellhead protection. Such standards can be especially important when addressing sites that have already been developed. In a management strategy that seeks to avoid, then minimize and then mitigate, performance standards are especially useful as mitigation tools. Performance standards can also help address the "reasonable provisions" stipulation in Section 15.2-2283 of the Virginia Code. Performance standards do not prohibit, for instance, the use/handling/storage of certain materials but instead establish conditions to prevent their introduction into the ground water. One option a community could consider when addressing expansion requests for pre-existing non-conforming uses would be to allow expansion through a special exception process requiring compliance with performance standards as conditions. Another option for a community seeking a more protective approach would be to include what are listed as guidelines here among its mandatory performance standards.

g) Performance Standards

Uses of the land and structures located in the Wellhead Protection Overlay District shall comply with the following mandatory standards.

1) Waste Water Management

a) In areas served by public sanitary sewers, all uses and structures shall connect to that system.

b) In areas not served by public sanitary sewers, only domestic, employee and occupant waste water systems may be discharged into the ground. Floor drains, sump pumps and similar devices may not be connected to systems discharging waste water to the ground.

2) Potential Contaminant Management

The following is applicable to uses involving the storage, handling, and manufacture or use of more than (fill in) pounds or (fill in) gallons of contaminants listed on the Maximum Contaminant List (MCL) under the Safe Drinking Water Act.

a) Storage containers shall be labeled and allow for visual inspection.
b) Storage containers for these substances shall be designed to protect against spillage and release during filling, mixing, withdrawal or use.
c) Storage containers for these substances shall be maintained, repaired and/or replaced so as to be kept in good working order for the prevention of leaks, spills or escapes.
d) Storage containers no longer in use shall be emptied, closed and properly disposed.

3) Abandoned Wells

a) Wells no longer in use shall be identified and permanently abandoned in compliance with Virginia Department of Health standards.

b) Site Plan Review: All development applications in the WHP Overlay District shall be subject to site plan review.

h) Guidelines

Users of the land and structures located in the Wellhead Protection Overlay District shall satisfy the Zoning Administrator that they have addressed the following advisory guidelines to the extent practical and in keeping with other site development objectives of the community.

1) Siting

a) Structures, including storm water management facilities, and associated activities should be located as far as possible from all public water supply wells.
b) Structures and associated activities, including storm water management facilities should be located down gradient from all public water supply wells.

2) Landscaping and Grading

a) Landscaping should minimize the use of plant materials requiring irrigation, heavy fertilization or use of pesticides.
b) Impervious surface, unless part of a containment system should be minimized so as not to impede infiltration and ground water recharge.
c) Grading should minimize slopes and contours which impede infiltration and ground water recharge.

There are several additional zoning tools that local governments might choose to add to their ordinances.

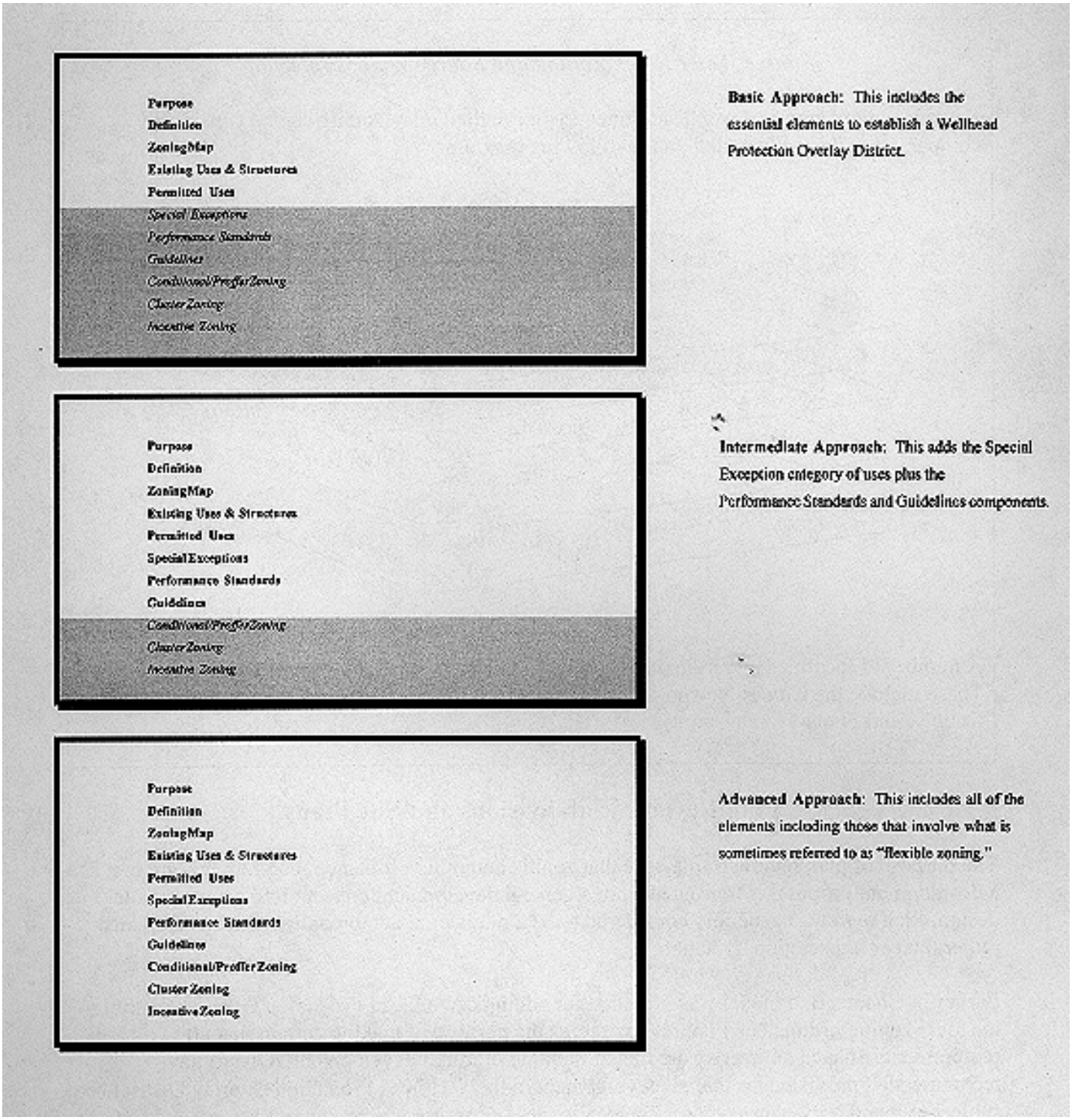
Section 15.2-2296 of the Virginia Code provides for conditional or proffered zoning whereby applicants may voluntarily add or subtract features from a rezoning proposal. One limitation of this approach is that it is only applicable where land is being rezoned and only at an applicant's initiative. Parcels that already have their zoning are not addressed by the proffer process. On the other hand, when a rezoning is proposed and the parcel is within or near a wellhead area, it is an opportunity for an applicant to proffer use restriction beyond those normally in the WHP district, to limit quantities of certain materials or to commit to certain beneficial siting, performance or design standards. Such proposals could emphasize the applicant's taking seriously the community's desire to protect its ground water sources and its public water supplies. A brief statement added to the section of the zoning ordinance declaring ground water protection as one purpose of proffered zoning would be sufficient to accomplish this objective.

Cluster development is another technique that can be added or modified in the local zoning ordinance. The basic logic of clustering is that it can reduce development costs, better utilize infrastructure, create more varied and attractive development, and preserve open space. If that open space is co-located with an area the community seeks to protect as a wellhead area or near such an area, clustering would protect source waters. An important factor in a residential cluster decision would be the manner of handling waste water when housing units are built more closely together. If this could be accommodated, then a cluster approach could offer a useful tool for wellhead protection. When a new public well is proposed as part of a new development, the opportunity to use clustering may be the greatest.

Section 15.2-2201 of the Virginia Code provides for incentives as part of zoning. These are defined as "the use of bonuses in the form of increased project density or other benefits to a developer in return for the developer providing certain features or amenities desired by the locality within the development." As with clustering, the trade-off between increased density and wellhead protection would have to be carefully weighed, but it is possible that a 10 percent density bonus, for instance, might be warranted in developments which provided significant source water protection amenities.

In each of the above instances - conditional zoning, cluster provisions, and incentives - no model text is offered but communities are encouraged to consider these additional tools as part of intermediate or advanced level approaches.

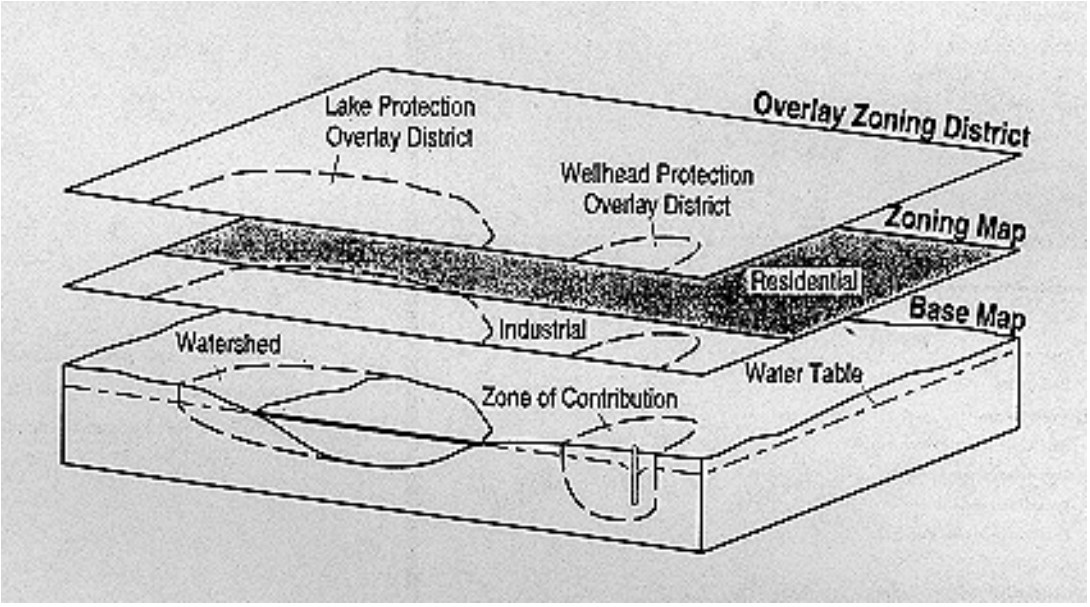
Figure 5: Zoning – Basic, Intermediate & Advanced Approaches



The above discussion of zoning lays out a number of possibilities. These can be combined as described in Figure 5 to produce basic, intermediate and advanced approaches.

Source Water Note: Zoning and Source Water Protection

Reservoir protection and wellhead protection through overlay zoning can be considered companion tools as illustrated on the following diagram.



A number of localities in Virginia has adopted some form of reservoir protection ordinance. These include the City of Newport News, James City County, Chesterfield County, Fairfax County, and Spotsylvania County.

Plan Review: Subdivisions and Site Plans

The purpose of plan review is to assure that zoning and other ordinance requirements are met as a development proposal is translated from a general development concept into an executable design. Plan review is generally considered to be a ministerial act to confirm code compliance rather than as a discretionary action.

Earlier in Chapter 3, a model was provided for adding a Wellhead Protection Overlay District to the local zoning ordinance. Plan review serves the purpose of making certain that all requirements of such an overlay are met at the time of initial development. One of the recommended provisions is that all development in the Wellhead Protection Overlay District be subject to mandatory plan review. If a locality does not have zoning, the provisions recommended in model zoning text as "design guidelines" could be incorporated into the locality's subdivision ordinance along with the other features recommended below.

Authority for Subdivision Review in Virginia

The Virginia Code requires localities to adopt "ordinances regulating subdivision and development of land" (15.2-2240) for the purpose of assuring orderly subdivision and development. An extensive set of provisions about how this shall or may be done follows.

The ministerial nature of plat approval is made clear in the following section.

> § 15.2-2259 – Local planning commission to act on proposed plat. The local planning commission or other agent shall act on any proposed plat within sixty days after it has been officially submitted for approval by either approving or disapproving the plat in writing, and giving with the latter specific reasons therefor. Specific reasons for disapproval may be contained in a separate document or may be written on the plat itself. The reasons for disapproval shall identify deficiencies in the plat which cause the disapproval by reference to specific duly adopted ordinances, regulations, or policies and shall generally identify modifications or corrections as will permit approval of the plat.

While wellhead protection is not a term explicitly used in this part of the code, several of the many provisions of the statutes are relevant to protecting ground water serving as the source of community water supplies. For example, Section 15.2-2241 gives a long list of mandatory provisions in local ordinances. Item 4 refers to the provision of water and other community facilities.

> § 15.2-2241 – Mandatory provisions of a subdivision ordinance. A subdivision ordinance shall include reasonable regulations and provisions that apply to or provide:
>
> 1. For plat details which shall meet the standard for plats as adopted under §42.1-82 of the Virginia Public Records Act (§42.1-76 et.seq.);
> 2. For the coordination of streets within and contiguous to the subdivision with other existing or planned streets within the general areas as to location, width, grades and drainage, including, for ordinances and amendments thereto adopted on or after January 1, 1990, for the coordination of such streets with existing or planned streets in existing or future adjacent or contiguous to adjacent subdivisions.
> 3. For adequate provisions for drainage and flood control and other public purposes, and for light and air, and for identifying soil characteristics;
> 4. For the extent to which and the manner in which streets shall be graded, graveled or otherwise improved **and water and storm and sanitary sewer and other public utilities or other community facilities are to be installed.**

Also, Section 15.2-2121, while not included in the subdivision statutes, also relates to a county's regulation of water, sewer and other facilities in subdivisions.

> Any county which has adopted regulations under Chapter 22 . . . of Title 15.2 of the Code of Virginia governing the use and development of land may also adopt regulations . . . fixing requirements as to the extent to which and the manner in which water, sewer and other utility mains, piping, conduits, connections, pumping stations and other facilities in connection therewith shall be installed as a condition precedent to the approval of an orginal plat of a subdivision. . . **Such regulations may require the water source to be an approved source of supply capable of furnishing the needs of the eventual inhabitants of such subdivision proposed to be served thereby.** Such regulations also may include requirements as to the size and nature of the water and sewer and other utility mains, pipes, conduits, connections, pumping stations or other facilities installed or to be installed in connection with the proposed water or sewer systems.

In an October 1997 opinion Attorney General Richard Cullen responded to a request from Albemarle County regarding its authority to base subdivision approval on adequate water supply. Albemarle's question had to do with lots served by individual wells. The Attorney General's opinion addressed their specific request as well as broader authority which would include community wells. This opinion states:

> It cannot be doubted that assuring future residents of new subdivisions an adequate water supply is integral to protecting the public health. The conclusion that a county may regulate the manner in which water is supplied but may not assure an adequate supply of water is not, in my view, mandated by application of the Dillon Rule. It is my opinion that, under the language of § 15.1-299 [now 15.2-2121] authorizing regulations requiring that a water source be "capable of furnishing the needs of the eventual inhabitants of [a] subdivision" and the declared legislative intent of promoting the public health in plans for the future development of communities, a county may enact regulations requiring reasonable assurance that each individual lot in a new subdivision will receive an adequate supply of water.

This opinion provides additional basis for a stipulation that a subdivision containing a community well provide assurance that this will be protected in a manner that it will be capable of providing an adequate water supply.

The state code includes the following regarding development proposals to be served by septic systems – one of the important potential sources of ground water contamination.

> § 15.2-2242 – Optional provisions of a subdivision ordinance. A subdivision ordinance may include:
>
> 1. Provisions for variations in or exceptions to the general regulations of the subdivision ordinance in cases of unusual situations or when strict adherence to the general regulations would result in substantial injustice or hardship.
> 2. **A requirement for the furnishing of a preliminary opinion from the applicable health official regarding the suitability of a subdivision for installation of subsurface sewage disposal system where such method of sewage disposal is to be utilized in the development of a subdivision.**

Under the broad authority of subdivision control, the following model is proposed as an addition to the subdivision provisions and/or plan review requirements which a locality may already have adopted. Since site plan review for higher density residential, commercial, or industrial uses is similar to subdivision review, the following model is intended to be applicable to either or both.

Model Text Provisions for Plat and Plan Review to Protect Ground Water Sources

1) Information to be Included With Plat or Site Plan Applications:

a) A vicinity sketch map showing the location of any public water supply wells and/or any land zoned for wellhead protection within one mile (or other locally determined distance) of the proposed subdivision or other development;

b) A map showing all parcels of land proposed to be utilized for public water supply wells and a statement indicating whether these parcels are intended to be dedicated,

reserved for public use or reserved for use by the property owners;

c) *If ground water is to serve as the source of a public water supply, a contingency plan addressing potential contamination sources within one thousand (or other locally determined distance) feet of the well site(s), mitigation measures either in place or proposed, and a plan for an alternate source of water if the proposed source were to fail, and;*
d) *If a subsurface sewage disposal system or systems are proposed, a letter approved by the health department regarding the suitability of such a method of disposal in this location. (Comment: the Health Department can be made a part of the plan review committee.)*

2) *Review and Approval of Plats or Site Plans:*

a) *If a proposed subdivision or development includes a lot or lots designated for public water supply, these shall be within a Wellhead Protection Overlay District.*
b) *A notation that land has been zoned to a Wellhead Protection Overlay District designation and noting the lot or lots serving as the location of the public water supply shall be recorded as part of any Final Plat or Development Plan.*
c) *Purchasers of land shall be provided such brochures and information pamphlets addressing Wellhead Protection as the (town, city, county of____) shall develop and provide to the subdivider or developer.*

Septic System Maintenance and Reserve Drainfield

Septic systems are one of five sources which the *Ground Water Protection Strategy for Virginia* (see inside front cover for ordering information) identifies as a statewide priority. In recognition of the potential of septic systems to impact both surface and ground water, the Chesapeake Bay Preservation Act and its implementing regulations require localities east of the fall line - and allow localities statewide - to adopt mandatory septic system maintenance and reserve drainfield provisions in their local ordinances.

Chesterfield County is a Virginia jurisdiction noted for its program in this regard. That county has amended its local health ordinance (Article II, Section 12-23) to state that "all septic systems shall be pumped and maintained once every five years" in a manner and by a person or entity approved by the county and to require a reserve drainfield.

Figure 6 is a brochure distributed by the county to property owners about the need for and requirement of septic system maintenance.

Figure 6: Chesterfield Country Brochure

CHESTERFIELD
COUNTY

Maintaining
Your Septic System
— A Guide For
Homeowners

Chesterfield Health Department
Environmental Health Service
P.O. Box 100
Chesterfield, VA 23832

Septic System Do's and Don'ts

Do's

Do learn the location of your septic tank and drainfield. Keep a sketch of your system.

Do have your septic tank pumped at least once every five years.

Do keep your septic tank cover accessible.

Do call a professional whenever you experience problems.

Do keep a detailed record of repairs, pumpings, inspections, etc.

Do conserve water to avoid overloading the system. Repair any leaky faucets or toilets.

Do divert other sources of water, such as roof drains, house footing drains and sump pumps, away from the system.

Don'ts

Don't go down into your septic tank. Toxic gases produced can kill in minutes — even if just looking into the tank.

Don't drive or park over any part of the system.

Don't plant anything over the drainfield except grass.

Don't dig in your drainfield or build over it.

Don't repair your system without permits.

Don't use septic tank additives. Some may even be harmful to your system.

Don't use your toilet as trash can or to dispose of chemicals or cleansers.

Don't use a garbage disposal unless your system can accommodate the additional waste.

Don't allow backwash from home water softeners to enter the system.

Don't install sprinkler systems within 20 feet of the drain field.

Why Maintain Your System?

There are three main reasons septic system maintenance is so important.

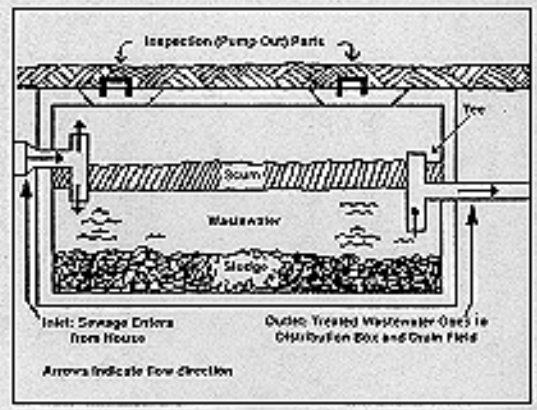
First is money. Failing septic systems are expensive to repair and replace. Preventive maintenance helps avert septic system failure.

Second is the health of your family, community and environment. When systems fail, wastewater is released and causes significant health risks.

Third is to protect the economic health of your community. Failed systems cause property values to decline and can result in building permits not being issued or real estate sales delayed.

Why Do Systems Fail?

Damage, overuse, abuse, tree roots, extraordinary weather conditions, installation, lack of maintenance and age often contribute to septic system failures. If your septic system has been properly designed, constructed and installed, *YOU* are the most likely remaining threat to your system. If you practice proper septic system operation and maintenance, failure is less likely.



Do not flush

Cat litter	Paints
Cigarette butts	Pesticides
Coffee grounds	Photographic supplies
Condoms	Sanitary napkins
Dental floss	Tampons
Disposable diapers	Thinners
Fat, grease or oil	Varnishes
Paper towels	Waste oils

These items overburden or destroy the biological process taking place in your system.

Is Your Septic System Failing?

The following may be warning signs of septic system failure:

- —Slowly draining sinks and toilets
- —Gurgling sounds in the plumbing
- —Plumbing backups
- —Ground wet or mushy underfoot in the area of the drainfield

Not one is a sure indication of failure, but the appearance of one or more of these warning signs should prompt inspection of the system.

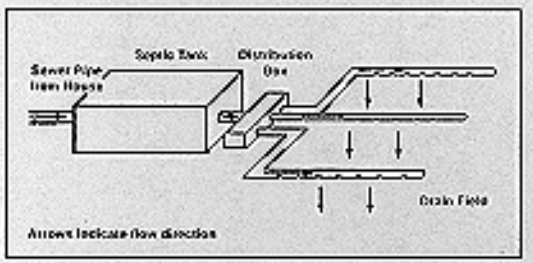
Systems also fail without warning. For this reason, pumping at regular intervals is recommended.

Chesterfield County ordinance requires pumping once every five years.

How to Maintain Your System

How Septic Systems Work

Household wastewater flows into the tank, where heavy solids settle to form sludge and light solids float to form scum. The sludge and scum remain in the tank and are broken down by bacteria. What isn't broken down over time periodically needs to be pumped out. The wastewater in the middle is pushed out into the drainfield as more wastewater enters the tank. The drainfield provides additional treatment by allowing wastewater to trickle from a series of perforated pipes, through gravel and down through soil. Soil acts as a natural filter and contains organisms that help treat the waste.



How to Care for Your System

Septic system maintenance can be compared to automobile maintenance — only a little effort on a regular basis can save a lot of money and prolong the life of the system. Sound septic system operation and maintenance practices include conserving water, being careful that nothing harmful is disposed of through the system, and having the system inspected annually and pumped regularly at least every five years.

Chesterfield Health Department
Environmental Health
P.O. Box 100
Chesterfield, VA 23832
(804) 748-1610

The National Small Flows Clearinghouse provided some of the information for this brochure. 3/96

The requirement of mandatory pump out and reserve drainfields has been in place in Chesterfield County since 1990 and local officials are reportedly pleased with the extent of homeowner compliance. Craig County in Southwest Virginia is another locality which has a mandatory pump out requirement. In this case, the Public Service Authority itself performs the pump out for their 350 customers on septic systems. Twenty percent are scheduled each year on a rotational basis so that all are pumped every five years.

Authority for Septic System Management in Virginia

Authority for mandatory septic system pump-out and reserve drainfields is found specifically in the Chesapeake Bay Preservation Act. These provisions are mandatory east of the fall line and optional elsewhere in the state.

> § 10.1 –2108
>
> Local government authority:
>
> Counties, cities, and towns are authorized to exercise their policy and zoning powers to protect the quality of state waters consistent with the provisions of this chapter.
>
> § 10.1-2110
>
> Local governments outside of Tidewater Virginia may adopt provisions:
>
> Any local government, although not a part of Tidewater Virginia, may employ the criteria developed pursuant to §10.1-2107 and may incorporate protection of the quality of state waters into their comprehensive plans, zoning ordinances and subdivision ordinances consistent with the provisions of this chapter.

The Chesapeake Bay Local Assistance Board regulations implementing the Act, contain the following provisions:

> § 1.3. Purpose of regulations (codified as 9 VAC 10-21-30):
>
> The purpose of these regulations is to protect and improve the water quality of the Chesapeake Bay, its tributaries, and other state waters by minimizing the effects of human activity upon these waters and implementing the Act …
>
> § 4.2. General Performance Criteria (codified as 9 VAC 10-20-120):
>
> On-site sewage treatment systems not requiring a Virginia Pollutant Discharge Elimination System (VPDES) permit shall:
>
> a. Have pump-out accomplished for all such systems at least once every five years;
>
> b. For new construction, provide a reserve sewage disposal site with a capacity at least equal to that of the primary sewage disposal site. This reserve sewage disposal site requirement shall not apply to any lot or parcel recorded prior to the effective date of these regulations, and which lot or parcel is not sufficient in capacity to accommodate a reserve sewage disposal site,

as determined by the local Health Department. Building shall be prohibited on the area of all sewage disposal sites until the structure is served by public sewer or an on-site sewage treatment system which operates under a permit issued by the State Water Control Board. All sewage disposal site records shall be administered to provide adequate notice and enforcement.

Model Text for Mandatory Pump-Out and Reserve Drainfield

A locality has several options in how it implements a mandatory pump-out requirement. One decision is whether to make the requirement applicable to the entire jurisdiction, or only to areas served by a public service authority, or only to areas which have been designated for wellhead protection. If a jurisdiction-wide approach is chosen, the local health ordinance is the logical place to implement the requirement. If the decision is to implement the requirement only in areas covered by a Wellhead Protection Overlay District, then the zoning ordinance is the logical place for the requirement. As the examples from Chesterfield County and Craig County point out, a second choice is whether to utilize private sector businesses to perform the necessary pumping and disposal or to incorporate pump-out as part of the services provided by the local Public Service Authority.

Before deciding about a mandatory pump out provision, it will also be important to confirm that the local wastewater treatment plant has the capacity to receive the anticipated volume of septage. If the system is running near capacity, another site will need to be found or the plant upgraded. The following model assumes a private sector approach and could be added to either the health or the zoning portion of the local code. It is based on the Chesterfield County code.

a) Maintenance and Repair of Septic Systems

1) *All septic systems shall be pumped and maintained once every five years. Such pumping and maintenance shall be performed in a manner approved by the (town, city, county) health department. The owner of a septic system shall, upon having the septic system pumped and maintained, certify in a form approved by the health department that such pumping and maintenance was performed. The pumping and maintenance required by this section must be performed by an individual or entity approved by the health department.*
2) *Every septic system shall be kept in good repair so that the system functions as originally designed.*
3) *If the (town, city, county) administrator, or the official designated by the administration, determines that the owner of a septic system has failed to comply with the requirements of subsection (a) or (b) of this section, they shall notify the owner of such determination by certified mail, return receipt requested, sent to the address listed in the real estate tax records. Such notice shall also notify the owner that they are required to correct the violation. If the violation is not corrected within 30 days after receipt of such notice, the county administrator may correct the violation.*

b) Disposition of Septage, etc.

Persons disposing of the sludge and other material removed from septic tanks shall comply with Virginia and local Health Department requirements.

c) Reserve Drainfields

All lots or parcels of land proposed for new development shall have a primary and a secondary sewage disposal site with a capacity at least equal to that of the primary site except in cases where sewer is provided; where sewer is planned and its availability within a reasonable time can be established; where such lot or parcel was recorded prior to the date of this ordinance, and is not sufficient in capacity to accommodate a secondary sewage disposal site as determined by the health department; or when the county health director files a waiver of necessity of the secondary site with the building official.

Notes on Chapter 3

- Notes on Zoning Ordinance changes.

- Notes on plat and plan review.

- Notes on septic system maintenance and reserve drainfield requirements.

Chapter 4 – Non-regulatory Approaches

The regulatory approaches discussed in Chapter 3 emphasize either prohibiting actions deemed at odds with the public health, safety, or general welfare or mitigation of adverse impacts by allowing certain actions only under carefully controlled conditions. As a generality, regulatory approaches do not so much encourage good practices as they seek to limit bad practices.

The converse of regulatory tools is tools based on other legal authorities, namely the power to acquire property/property rights (i.e., easements) and the ability to set taxes to reward actions with a demonstrable public benefit. A full package of implementation tools needs to include both regulatory and non-regulatory approaches.

Acquisition of Property or Easements

The most certain way for a local government to control the uses of lands which are contributing recharge to a public water supply is through ownership. Holding title to land or an easement gives the owner rights and far greater controls than is possible through regulations alone.

Typically, a well lot is a small piece of land surrounding the immediate site of the well and fenced from encroachment. It is owned by the local government, a homeowner's association or a for-profit water supplier. While control of the well lot itself may be certain, the wellhead protection area is likely to be significantly larger and often in multiple private ownerships. These private owners may have no intention of developing their land, preferring to keep it in agricultural and forestal use or they may be anticipating development at some future time. From a wellhead protection standpoint, open space would be a preferred use compared to development. It should be acknowledged, however, that some open space uses can pose potential threats to water supplies.

Zoning, even for a Wellhead Protection Overlay District, may also allow uses which could pose risks. Zoning which is so restrictive as to allow only a few uses, however, would be difficult to defend either politically or legally. Property owners and judges sometimes respond, "if you want it, buy it" – "buying it" is, in fact, one option for source water protection.

Purchase could be full fee simple title to the land or an easement which significantly restricts the uses allowed of the land. The larger the land area and the greater its development potential, the greater its cost, and cost can be a limiting factor in the purchase of open space land. Another approach is to encourage donation of land or easements to protect the water supply in exchange for local property tax reduction as well as possible federal inheritance and income tax benefits . One of the major advantages of this type of non-regulatory approach is that it offers the landowner a financial incentive to put the land into a condition whereby its wellhead protection benefits are more nearly guaranteed.

Authority for Property/Easement Acquisition in Virginia

Several sections of the Virginia Code authorize non-regulatory tools involving full or partial property owner compensation. The Open Space Land Act contains the following definitions:

> 10.1-1700. Definitions – As used in this article, unless the context requires a different meaning.
>
> *"Open-space land"* means any land in an urban area which is provided or preserved for (i) park or recreational purposes, (ii) **conservation of land or other natural resources**, (iii) historic or scenic purposes, (iv) assisting in the shaping of the character, direction, and timing of community development, or (v) wetlands as defined in 62.1-13.2
>
> *"Urban area"* means any area which is urban or urbanizing in character, including semiurban areas and surrounding areas which form an economic and socially related region, taking into consideration such factors as present and future population trends and patterns of urban growth, location of transportation facilities and systems, and distribution of industrial, commercial, residential, governmental, institutional, resort and other activities.

Areas where wellhead protection is often most needed are the growing portions of towns, counties or cities falling under the above definition of "urban area". Wellhead protection and source water protection are consistent with the "open space land" and "conservation of land or other natural resources."

The authority for public bodies to acquire land for open space is given in the following section (public body is defined as "any state agency having authority to acquire land for a public use, or any county or municipality, any park authority, any public recreational facilities authority of the Virginia Recreational Facilities Authority.")

> 1. Authority of public bodies to acquire or designate property for use as open-space land – To carry out the purposes of this chapter, any public body may (i) acquire by purchase, gift, devise, bequest, grant or otherwise title to or any interests or rights of not less than five years duration in real property that will provide a means for the preservation or provision of open-space land and (ii) designate any real property in which it has an interest of not less than five years duration to be retained and used for the preservation and provision of open-space land. Any such interest may also be perpetual.
>
> The use of the real property for open-space land shall conform to the official comprehensive plan for the area in which the property is located. No property or interest therein shall be acquired by eminent domain by any public body for the purposes of this chapter; however, this provision shall not limit the power of eminent domain as it was possessed by any public body prior to the passage of this chapter. (1966, c. 461, 10-152; 1974, c. 259; 1981, c. 64; 1988, c. 891)[1]

[1] Clarke County found itself, under the broad power of eminent domain, unable to negotiate for the purchase of a 5 acre buffer around one of its public water supply sources and had to resort to condemnation to successfully acquire the land it needed. Considerable added time and cost resulted from the need to exercise the eminent domain condemnation authority under Article 1 of Chapter 7 of Title 15.1 and other provisions of the Code of Virginia.

The second paragraph above stipulates that the acquisition action must be in conformance with the comprehensive plan and this underscores the point made in Chapter 2 that the plan serves as the foundation for other implementing actions.

Chapter 10.1 of the Virginia Code (The Virginia Conservation Easement Act) further defines the type of easement, which may be placed on land by owners for conservation purposes in exchange for tax and other benefits when full fee simple title is not the objective.

> 10.1-1009. Definitions – As used in this chapter, unless the context otherwise requires:
>
> *"Conservation easement"* means a nonpossessory interest of a holder in real property, whether easement appurtenant or in gross, acquired through gift, purchase, devise, or bequest imposing limitations or affirmative obligations, the purposes of which include retaining or protecting natural or open-space values of real property, assuring its availability for agricultural, forestal, recreational, or open-space use, **protecting natural resources, maintaining or enhancing air or water quality,** or preserving the historical, architectural, or archaeological aspects of real property.

Such an easement is placed in the hands of a "holder" defined as:

> *"Holder"* means a charitable corporation, charitable association, or charitable trust, which has been declared exempt from taxation pursuant to 26 U.S.C.A. 501 (c)(3) and the primary purposes or powers of which include: (i) retaining or protecting the natural or open-space values of real property; (ii) assuring the availability of real property for agricultural forestal, recreational, or open-space use; (iii) **protecting natural resources; (iv) maintaining or enhancing air or water quality**; or (v) preserving the historic, architectural or archeological aspects of real property.

In both of the above definitions, the protection of natural resources and maintaining or enhancing water quality are key phrases consistent with source water protection.

The Virginia Outdoors Foundation, established in 1966, is the primary holder of such easements in this state. VOF holds easements on over 100,000 acres in over 30 counties of the Commonwealth. VOF publishes guidelines which describe its process and requirements. Factors the VOF considers in establishing its priorities include support from local landowners, existence of local organizations interested in working with VOF and an expression from the local government indicating an interest in protection of an area through easements. While VOF emphasizes areas of statewide significance, smaller wellhead protection areas might be combined with larger areas possessing significant conservation values on other grounds such as proximity to Scenic Rivers, Scenic Highways, Virginia By-Ways, state or national parks, wilderness areas, properties listed on the Virginia Landmarks Register, or involving wetlands, wildlife habitat, biological diversity, prime agricultural land, scenic resources, riparian corridors, critical slopes or unique species.

Because model conservation easements can become quite lengthy (e.g., the model published by the Land Trust Alliance runs some 22 pages), no model deed of conservation easement is offered in this report. Rather, the town, county or city attorney should work with the property owner and the prospective holder of the easement to negotiate mutually acceptable terms.

To identify lands which might possess conservation values in addition to their value as wellhead protection areas, the following checklist is offered as a model for identifying areas for possible acquisition either in full fee simple or through easements. This checklist can help determine whether the Virginia Outdoors Foundation might be interested or whether a site would primarily serve local interests. Other organizations which might hold easements include a local land trust, a soil and water conservation district or a local government entity set up to hold easements

Model Inventory of Potential Conservation Values

(one form should be completed for each public water supply well)

1. *Well or Wellfield Name and Location*
2. *Size and Configuration of Well Lot (attach plat)*
3. *Topography in Relation to the Well Lot (attach map)*
4. *Size and Configuration of Wellhead Protection Area (attach map)*
5. *Daily Withdrawal and Number of Customers*
6. *Do Adjacent Lands Have the Following Characteristics?*

Open space conservation designation in comprehensive plan	*yes*	*no*
Adjacent lands with easements	*yes*	*no*
Wetlands	*yes*	*no*
Wildlife habitat	*yes*	*no*
Biological diversity	*yes*	*no*
Historic resources	*yes*	*no*
Prime agricultural land	*yes*	*no*
Scenic resources	*yes*	*no*
Riparian corridors	*yes*	*no*
Critical slopes	*yes*	*no*
Unique species	*yes*	*no*
Scenic Rivers	*yes*	*no*
Scenic Highways	*yes*	*no*
Virginia By-Ways	*yes*	*no*
State parks	*yes*	*no*
National parks	*yes*	*no*
Local parks	*yes*	*no*
Wilderness areas	*yes*	*no*
Properties on National & State Historic Registers	*yes*	*no*

Use of this model checklist, or a modifed version of it, will assist the locality in assessing the feasibility of addressing its wellhead protection areas through the provisions of a conservation easement or purchase.

Funding for Acquisition for Wellhead Protection

The Virginia Code provides a number of methods for localities to fund acquisition.

> 10-1702. Further power of public bodies – A. A public body shall have the powers necessary or convenient to carry out the purposes and provisions of this chapter, including the following powers:
>
> 1) To borrow funds and make expenditures;
> 2) To advance or except advances of public funds;
> 3) To apply for and accept and utilize grants and any other assistance from the federal government and any other public or private sources …
> 4) Levy taxes and assessments.

On the basis of these powers, local governments may wish to take advantage of grants under the recently established Water Quality Improvement Fund administered by the Virginia Department of Conservation and Recreation (contact Charlie Lunsford – 804/371-8984). The Water Quality Improvement Act of 1997 created this fund and contains the following provision.

> 10.1-2132 C. Grant funding may be made available to local governments...who propose specific initiatives that are clearly demonstrated as likely to achieve reductions in nonpoint source pollution, including excess nutrients, to improve the quality of state waters. Such projects may include, but are in no way limited to, the acquisition of conservation easements related to the protection of water quality....

The Land Acquisition/ Conservation Easement Loan Program available through the Virginia Department of Health and described in Figure 7 is also an appropriate funding mechanism for such purposes.

Figure 7: Land and Conservation Easement Acquisition Loan Program

The 1996 Amendments of the SDWA promote non-regulatory solutions for source protection Measures to achieve a goal of insuring safe and reliable water to consumers.

The Virginia Department of Health utilizes a portion of the Annual Drinking Water State Revolving Fund Set-Aside monies to provide assistance to a water-works in the form of a loan, to acquire land or a conservation easement for source water protection purposes.

Criteria for loan eligibility:

- Applicant must be a Community or Non-profit Noncommunity waterworks.
- Site must be located in the "Delineated Source Water Protection Area".
- Landowner must be a willing seller.
- Land cannot be resold while the drinking water source is still being used.
- Conservation easements must be recorded in land records.
- For acquired land, the recipient must enter into legally binding agreement to manage land to protect drinking water quality.
- For easements, the waterworks and the landowner must agree to acceptable conservation practices and land uses.

Loan repayments will be handled in accordance with the Drinking Water State Revolving Fund requirements.

A Priority Ranking/Scoring System will be employed to rank loan applications.

For additional information on this program, please contact:

Virginia Department of Health
Division of Water Supply Engineering
Thomas B. Gray, P.E.
(804) 786-1087

This program is of potential use for surface water sources in addition to wellhead protection areas.

Use Value Taxation and Agricultural/Forestal Districts

Other non-regulatory tools which can be adapted for wellhead protection are the Use Value Taxation and Agricultural/Forestal (A-F) District parts of the Virginia Code. These two tools are similar in that they both grant property tax reductions for non-development uses of land. Unlike full fee simple acquisition or easements in perpetuity, A-F Districts and use value taxation have a more limited duration. Though there are rollback tax penalties for withdrawal from use value, these do not prevent reversion of the land to development purposes. Property owners may also request withdrawal at the time of renewal of an A/F District.

Ideally, reduced taxation and appropriate restrictions on land use would be part of a package which balances public and land owner costs and benefits. Without pairing tax reductions with use restrictions, practices may be rewarded which could be at odds with the goal of water supply protection. In those cases, tax reductions could have a perverse effect. Therefore, localities are advised to think in terms of "packages" of wellhead protection tools.

Use value taxation was signed into law in 1971 and since then over 100 local governments in Virginia are utilizing one or more of its provisions. The most popular categories based on acreage are forestal (51%) and agricultural (45%) with horticultural and open space uses accounting for 2% each. The category of use which most closely corresponds to wellhead protection is the open space category which includes the conservation of natural resources, though wellhead protection areas could also be located in agricultural, forestal, or horticultural areas as long as the caution about use restrictions stated above is heeded. As of 1995, sixty-five localities had adopted the open space use category.

Another economic incentive program is the Virginia Agricultural Cost-Share Program administered by the Department of Conservation and Recreation and the local soil and water conservation districts. If a wellhead protection area includes active pasture, orchard, crop, or other agricultural land, this could be an important program to get the landowners to install BMPs.

Authority for Reduced Taxation in Virginia

The Virginia Code sets out the authority for special assessment for land preservation as follows:

> § 58.1-3231. Authority of counties, cities and towns to adopt ordinances; general reassessment following adoption of ordinance. – Any county, city or town which has adopted a land-use plan may adopt an ordinance to provide for the use value assessment and taxation, in accord with the provisions of this article, of real estate classified in § 58.1-3230.
>
> * * *
>
> Such ordinance shall provide for the assessment and taxation in accordance with the provisions of this article of any or all of the four classes of real estate set forth in § 58.1-3230.

These four classifications are "real estate devoted to agricultural use," "real estate devoted to horticultural use," "real estate devoted to forestal use", and "real estate devoted to open space use." Open space use means:

> Real estate used as to be provided or preserved for park or recreation purposes, **conservation of land or other natural resources**, floodways, historic or scenic purposes, or assisting in the shaping of the character, direction, and timing of community development or for the public interest and consistent with the local land-use plan. . .

Again the reference to conservation of land or other natural resources and the link to the local land use plan should be noted for wellhead protection purposes.

In order to be granted a reduced assessment, the property must meet a number of standards, including minimum size. For open space uses, the state minimum is 5 acres, unless a larger minimum is established locally. When the land is adjacent to a scenic river, a scenic highway, a Virginia By-way, or a public property designated in the Virginia Outdoors Plan, the state minimum is reduced to 2 acres. For a freestanding wellhead protection area to meet the minimum open space size it would need to be at least 5 acres, or 2 acres under the circumstances just described. If part of a larger area, a wellhead protection or a surface water protection area might qualify under one or more of the other categories as well.

If the provision of the Agricultural/Forestal district are employed, the minimum core area is 200 acres for districts of "statewide" significance covered by sections 15.2-4300 et seq. Wellhead protection areas themselves may not be this large, but in combination with other parcels or for surface waters protected as source waters, the 200 acre threshold may be realistic. Districts of "local" significance covered under 15.2-4400 et seq. need only have 20 acres. Authority for A-F districts is contained in Chapter 36 of the Code, Agricultural and Forestry Districts Act.

Model Text for Open Space Protection of Wellhead Areas

"Open space use means real estate used as or preserved for park or recreation purposes, conservation of land and other natural resources ***including ground water sources for public water supplies****, floodways, historic or scenic purposes, or assisting in the shaping of the character, direction, and timing of community development or for the public interest and consistent with the comprehensive plan".*

These words (see bold above) can be incorporated into the local ordinance establishing use value taxation and/or Agricultural/Forestal Districts to make clear the legitimacy of these tools for use for wellhead protection purposes as part of the broad state authorization. Other local ordinance provisions should address the broad categories of uses falling under "park and recreation purposes." The model zoning text provisions in Chapter 3, for instance, suggest that golf courses be restricted in the Wellhead Protection Overlay District.

Notes on Chapter 4

- Notes on potential acquisitions and easements.

- Notes on use value taxation and agricultural-forestal districts.

Chapter 5: Public Education & Oversight

A full implementation package will be incomplete without two additional components: a program of public education and designation of an individual to take leadership responsibility for wellhead protection.

Wellhead protection is at its root a partnership – a partnership that includes consumers, land owners, water suppliers, tax payers and other citizens as well as local staff and elected and appointed officials. To have an effective partnership, it is necessary that all the participants share at least a minimum understanding of ground water, its vulnerabilities and limits, and their own role in its use, conservation and protection.

The next section of this report addresses this need for public education by describing three approaches: a brochure, a program of on-site visitation, and a national program called the Ground Water Guardian. These could be viewed cumulatively as basic, intermediate and advanced levels of public education and outreach.

The final section offers a model job description for a person designated as taking the lead in wellhead protection. This same person could also be assigned overall source water protection responsibility.

Public Education

It is a safe assumption that most people are unfamiliar with wellhead protection or even the fact that ground water is the source from which their public water supply comes. Most people would not know who to contact if they wanted to learn more about wellhead protection. Who to contact is addressed later in this chapter as one of the duties of the wellhead protection manager.

The amount of public information about public water supply issues will be increased by the Consumer Confidence Report and Source Water Assessment processes described in the Preface to this report. However, neither of these processes will address the element of prevention or the types of implementation components addressed in this report. Additional public education and outreach are needed.

Information Brochure

A basic level of public understanding can be achieved by a wellhead protection brochure mailed or otherwise distributed to recipients. Two examples follow which can be used as starting points by other localities. Certain of the information in each example is specific to that locality and would need to be modified or abbreviated before being used by others. (Though the purpose is specific to septic maintenance requirements, Figure 6 provides another example of a brochure.) The basic topics in Figures 8 Henrico and 9 Stanley are generally applicable and consist of:

Model Brochure Components

- Definition of wellhead protection;
- Rationale for wellhead protection;
- Description of local ground water supplies;
- A graphic depiction and/or map;
- Description of local actions to date;
- "What you can do" or a "Do" and "Don't" section, and;
- Contact name and number.

Figure 8 – Henrico County Brochure

Wellhead Protection in Henrico County

The Henrico County ground water geologist and other employees recently conducted a wellhead protection pilot project funded by a grant from the United States Environmental Protection Agency (EPA) and administered by the Virginia Department of Environmental Quality. The goal of this project was to investigate the potential for contamination of public water supply wells in the County and to begin to devise a plan for their protection. The purposes of this brochure are to provide you with a brief summary of the project and to inform you of its importance to you.

Wellhead Protection

"Wellhead Protection" is the name given to the process of preserving the land area around a water well through which precipitation or surface water that replenishes the well is drawn. It is important to realize that precipitation is the source of drinking water withdrawn from the ground. Water wells are drilled into the ground to points where they can withdraw water from areas within the earth or bedrock where good water is found in sufficient quantity. These areas or layers are known as "aquifers." They differ from other layers or areas in the ground because they have more interconnected open spaces through which water will flow.

Water falling on the earth will be drawn into aquifers in one of two ways. If the aquifer is exposed at the land surface, water will flow into it either from a body of surface water or from precipitation seeping downward through the overlying layers in the earth. If the aquifer is not exposed on the surface or beneath a body of water, that portion of precipitation that does not run off or is not evaporated from the earth will gradually seep downward to the aquifer through the overlying layers in the earth. Contaminants on the surface of the earth, in these overlying layers or in surface water, can be carried into the aquifer along with the water that is recharging the aquifer. For this reason it is necessary to protect areas through which the recharging water moves in order to maintain the quality of the water supplied from a well.

Wellhead Protection Areas

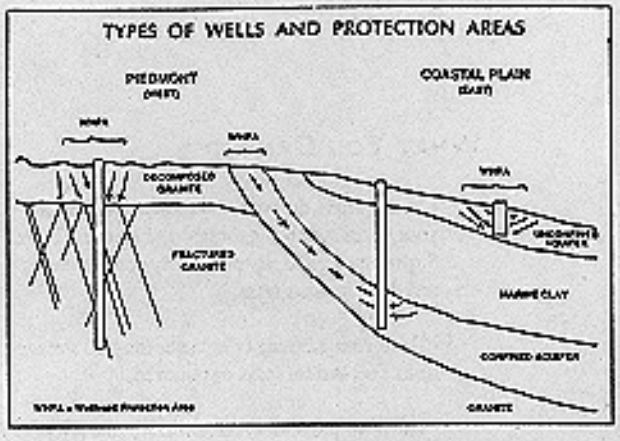
Before an area can be protected, it must be defined. If the exact nature of the aquifer and the surrounding material are known, along with the properties of the well, defining the protection area can be done accurately. Since complete information on these factors is seldom available, an educated guess is often the best that can be expected. The area calculated or estimated is known as a "Wellhead Protection Area" or "WHPA." The project completed in Henrico County consisted of obtaining the available data for public water supply wells, making estimates or calculations to delineate wellhead protection areas and providing the County Planning Office with information for planning purposes which could prove useful in minimizing ground water pollution. It was not our desire to place additional burdens on County residents, but rather to provide them with some protection against possible threats to their drinking water.

What We Have Done

In late 1990 and early 1991, we gathered all of the available information on Henrico's public water supply wells and visited them. We then made an estimate of the area around each individual well that should be protected. After estimating these areas, we located a map in the Henrico County Planning Office to see if existing zoning allowed potential sources of contamination to be constructed in these areas. Information that was developed will be provided to the Planning Office for review as part of the update of the County's Comprehensive Plan.

What You Can Do

1. Try to use less water.
2. When using pesticides or fertilizers, follow the manufacturers' instructions so that you will not use too much of the chemicals.
3. Do not dump motor oil, paint, solvents or other waste in ditches or storm sewers or on the ground. For information on the proper disposal of motor oil, call 1-800-451-1612. For information on the proper disposal of other wastes, call the Department of Environmental Quality Waste Program at 527-5030.
4. If you have a septic system, make sure that it is kept in good repair and cleaned out periodically. Do not discharge chemical wastes to your septic system.
5. Find out if there were any potential sources of contamination on your property, such as buried fuel tanks, fuel oil spills, waste disposal areas or home businesses.
6. Be on the lookout for water wells which are out of service. If they are not going to be used again, they need to be abandoned properly. If they are out of service temporarily, they need to be sealed. This is not just common sense; it is State law. For information on well abandonment in Henrico County, call the Health Department at 672-4530.
7. Report illegal dumping of any sort of wastes by others by calling the Department of Environmental Quality Pollution Response Program at 527-5200.
8. Avoid excessive use of snow-melting chemicals.



Aquifers in Our County

Ground water in Henrico County is found in two different types of aquifers: consolidated rock and unconsolidated sediments. The illustration is a generalized profile of these aquifers. The aquifer in the western portion of the County consists of the fractures and joints in the granite bedrock and the decomposed granite above the bedrock. This aquifer is particularly vulnerable to contamination from any pollutants introduced at the land's surface.

Aquifers in the eastern portion of the County are made up of unconsolidated sand, gravel, silt and clay. One of these aquifers, known as the "water table aquifer," is located near the surface of the earth. Many private wells are now withdrawing water from this aquifer. But it appears that only three public water supply wells are. This is fortunate, because these wells are especially vulnerable to contamination from pollutants on the land around them. The more water that is withdrawn from these wells, the greater the area around them that requires protection. Beneath the surface aquifer are thick layers of clay through which the water moves very slowly. Beneath the layers of clay are other aquifers known as "confined" or "artesian" aquifers. Most of the public water supply wells in the eastern portion of Henrico County withdraw water from these aquifers.

The water recharging confined aquifers enters by two different routes. A portion of it leaks very slowly through the overlying clay layers. The rest is believed to enter the aquifer at the points near the James River where the aquifer is exposed at the land surface. The latter areas must be protected from uses which may leave contaminants on the land surface. In addition, it is important to eliminate any conduits from the surface to the lower aquifers, such as improperly abandoned wells.

Why Bother?

There are numerous instances of individual domestic wells being contaminated by fuel leaks and spills in the Central Virginia area. Once contaminated, ground water is difficult, and sometimes impossible, to clean. Remediation of these problems is a long, expensive process. Often much time is lost simply investigating a problem. Since cleaning the aquifer itself is time-consuming, other sources of water must be obtained, either by hauling or by connection with the municipal water system. For people used to well water, this is often an unwelcome change.

We are fortunate in this county not to have had contamination of a public water supply. However, other areas of Virginia have not been so lucky. The towns of Berryville and Pocahontas have had public water supply wells contaminated and have had to find other sources. The best solution to such problems is to do everything possible to prevent them from happening. The Department of Public Utilities will do its best to preserve the quality of Henrico County's water as a valuable and irreplaceable resource. We hope you will help us.

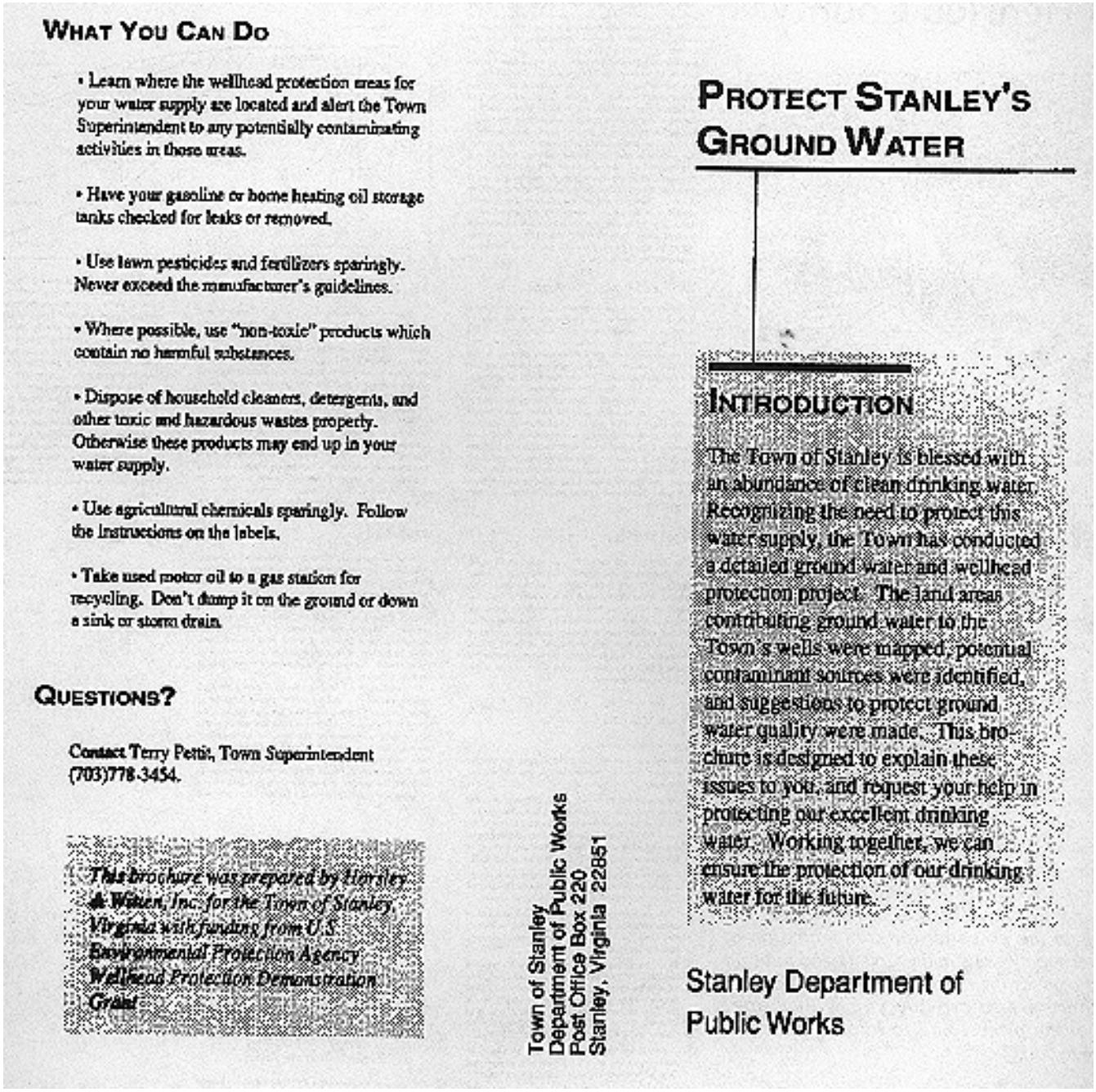
For more information, please call

261-8715

Department of Public Utilities

Proud of our progress;
Excited about our future.

Figure 9- Town of Stanley Brochure



What You Can Do

- Learn where the wellhead protection areas for your water supply are located and alert the Town Superintendent to any potentially contaminating activities in those areas.
- Have your gasoline or home heating oil storage tanks checked for leaks or removed.
- Use lawn pesticides and fertilizers sparingly. Never exceed the manufacturer's guidelines.
- Where possible, use "non-toxic" products which contain no harmful substances.
- Dispose of household cleaners, detergents, and other toxic and hazardous wastes properly. Otherwise these products may end up in your water supply.
- Use agricultural chemicals sparingly. Follow the instructions on the labels.
- Take used motor oil to a gas station for recycling. Don't dump it on the ground or down a sink or storm drain.

Questions?

Contact Terry Pettit, Town Superintendent
(703)778-3454.

This brochure was prepared by Hornley & Wilson, Inc. for the Town of Stanley, Virginia with funding from U.S. Environmental Protection Agency Wellhead Protection Demonstration Grant

Town of Stanley
Department of Public Works
Post Office Box 220
Stanley, Virginia 22851

Protect Stanley's Ground Water

Introduction

The Town of Stanley is blessed with an abundance of clean drinking water. Recognizing the need to protect this water supply, the Town has conducted a detailed ground water and wellhead protection project. The land areas contributing ground water to the Town's wells were mapped, potential contaminant sources were identified, and suggestions to protect ground water quality were made. This brochure is designed to explain these issues to you, and request your help in protecting our excellent drinking water. Working together, we can ensure the protection of our drinking water for the future.

Stanley Department of Public Works

Stanley's Ground Water Resources

Stanley's wells draw water from a series of limestone and sandstone formations formed over 500 million years ago. A major geologic fault, named the Stanley Fault, extends through the Shenandoah Valley and the our town. The fault is important as it provides a conduit through which ground water flows. Once ground water enters the faulted zone, it appears to flow along the fault, and eventually discharges into the Shenandoah River.

Pumping of ground water by each of the Town's 5 production wells alters the natural flow of ground water. By understanding movement of water through the rock near the wells, the areas contributing water to them -wellhead protection areas - have been mapped.

Wellhead Protection Areas

Wellhead protection areas are mapped based on the zone of contribution to a well — the land area around a well through which rain and other water percolates into the soil and travels to the well. The enclosed map shows the locations of the wellhead protection areas within the Town. Proper management of these areas is critical to protecting the Town's water supply.

Stanley is fortunate that the majority of the rock formations supplying water to the wells are overlain by up to 120 feet of clay. The clay restricts the movement of water (and contaminants) from the land surface into the underlying aquifer. Even with the natural protection provided by the clay, we in the Town need to ensure that our activities will not threaten the water supply.

Potential Contamination Problems

A variety of uses related to industry, commerce and even residential life threaten the quality of ground and surface water. To a certain extent, the land's vegetation and topsoils have a natural ability to attenuate, or break down contaminants. However, where the intensity of land uses exceeds this natural attenuation capacity, contamination of ground water results.

Solid Waste

The northern end of the current landfill lies within the protection area to Well #3. Landfills are known sources of contamination and typically result in pollutants including nutrients, metals and hydrocarbons.

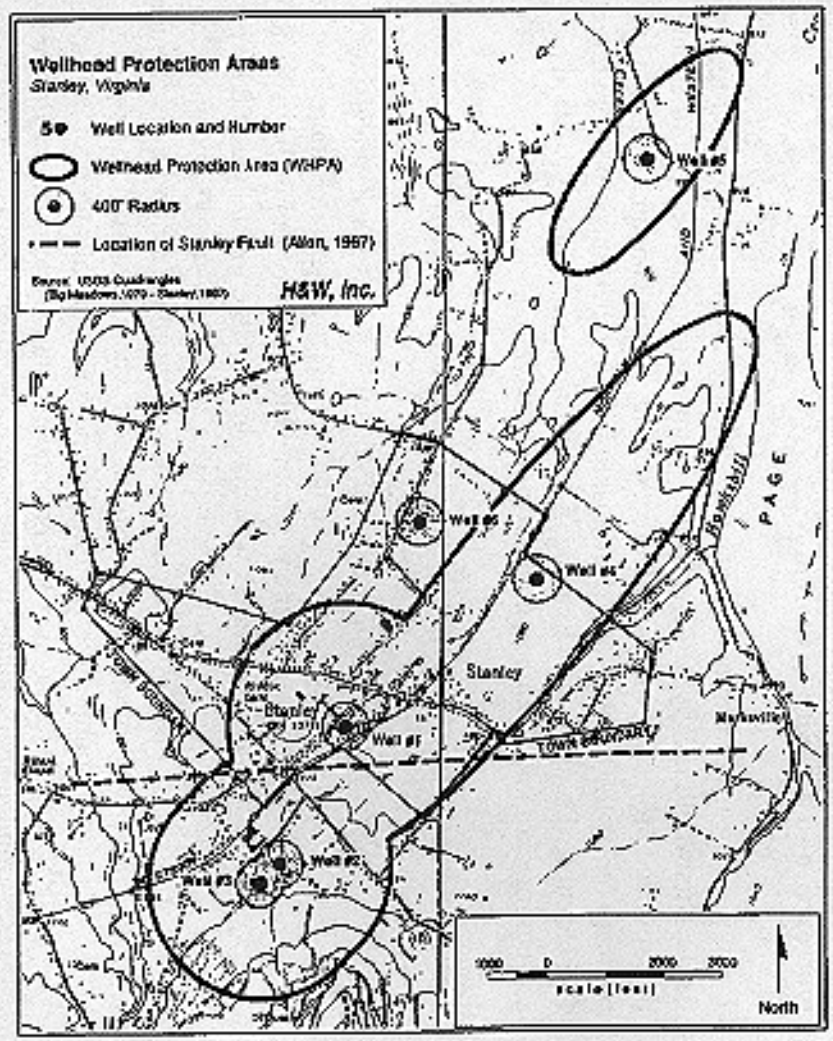
Toxic and Hazardous Waste

Although Stanley is not a highly industrialized area, numerous businesses utilize toxic and hazardous materials. Even small quantities of these chemicals can contaminate water resources. These chemicals should never be put directly into the ground and their containers should not be discarded on the ground, or in the trash.

Underground Storage Tanks

Underground storage of hazardous materials has historically been a significant source of ground water contamination. Even a small leak can contaminate a substantial amount of water. For example, seven drops of benzene (a component of gasoline) will contaminate enough water to fill an olympic sized swimming pool. Underground tanks in wellhead protection areas should be removed or monitored carefully to protect water quality.

Map of Stanley's Wellhead Protection Areas



Outreach and On-Site Visitation

There is no means of public outreach that is more valuable than person-to-person contact in the field. This would ideally be done by the person assigned duties described later in this chapter as the wellhead protection manager. Direct contact is time consuming but this may be more than made up for by the learning and relationship building that can come from direct outreach efforts. The brochure discussed above can be used in conjunction with a visitation program. It can serve as a calling card and reminder of what was discussed in a visit.

Those who have done this sort of outreach work, have generally found the following:

1) *Who to Visit: If the wellhead protection area is small, the visitation program could be comprehensive and include all landowners. If there have been reports of possible or confirmed contamination, priority should be given to individuals affected and to persons who may be unaware that they could be part of the problem. Visits could also be seen as a follow-up to Consumer Confidence Reports that have alerted the public to drinking water issues. Source water assessment reports may also suggest where to start. Otherwise, a good starting point might be a land owner or potential source of pollution with whom there may be some prior acquaintance and relationship. In some cases a mutual acquaintance might arrange a meeting. It is a good idea to visit a number of sites in order not to give the impression that a few people are being singled out.*

2) What to avoid: Things to avoid are the impression that blame has been assigned, that the visit is an "inspection", that the person being contacted is "in trouble" or that their livelihood or property are being threatened.

3) What to encourage: Things to encourage are an informal atmosphere, a sense of common objectives, a common sense approach to business, and opportunities for volunteering either to change practices and/or to join with others for mutually beneficial programs in the future.

4) What to look for: There are things that can be learned in the field that might never have come to mind working back in the office. These can include topography, land use history, sources beyond the wellhead protection area, abandoned wells, and other factors. Part of the benefit of on-site visitation is the chance to learn as well as to teach. Learning can assure that the wellhead protection program is realistic and achievable. Most property owners or users are willing to talk and are flattered when someone takes an interest in them and their activities and treats them like the valued member of the community which they are.

5) Time commitment: The amount of time that goes into on-site visitation will vary in relation to other demands of the visitor's job. Other demands should not be allowed to crowd out visitation altogether, however. Outreach is best viewed as a long-term effort, perhaps with peaks when issues arise, rather than as a task which can be accomplished once and put aside.

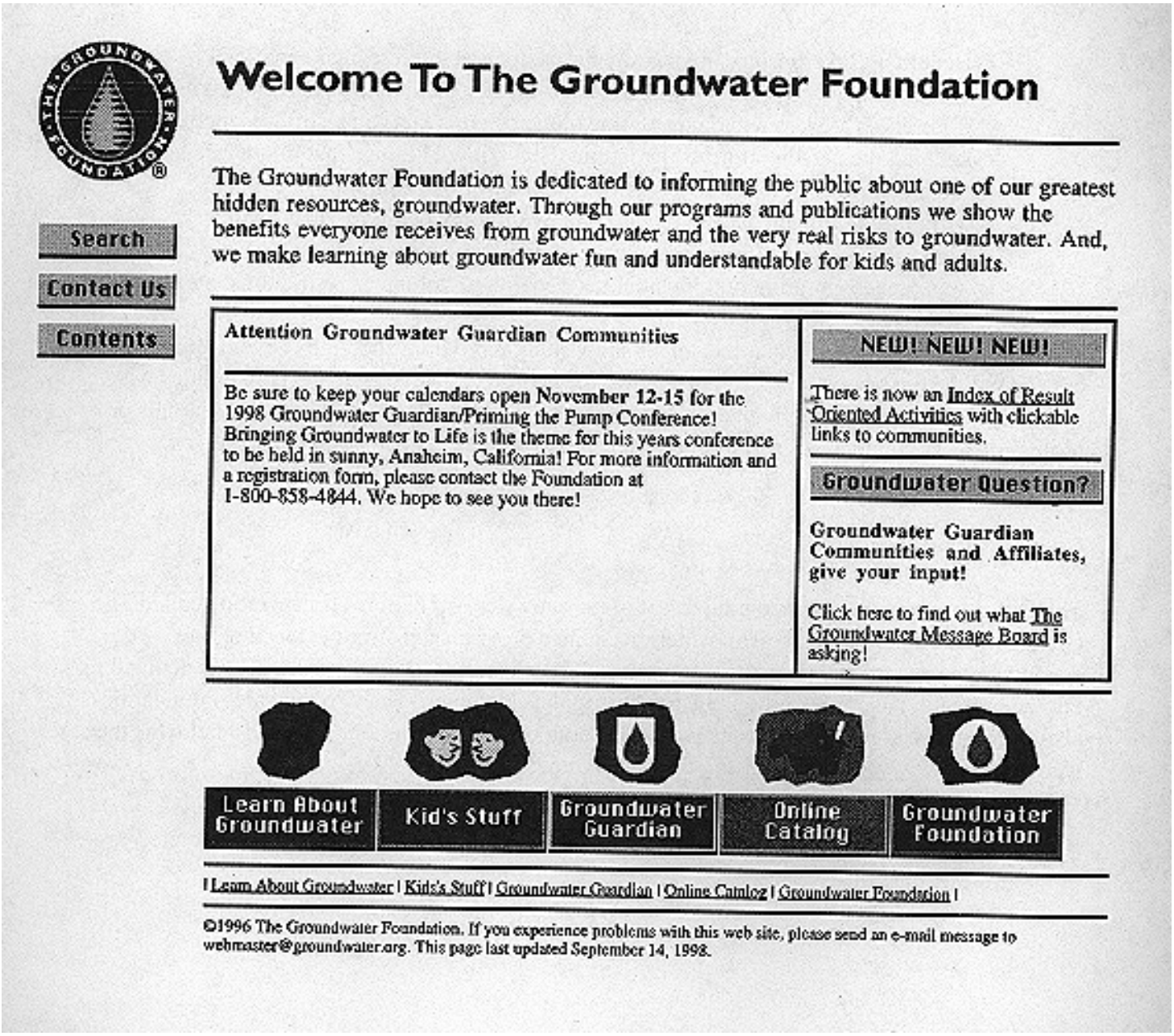
6) Benefits: Relationships are based on trust, mutual interests and beneficial exchanges. When mutual benefits are strong, then inevitable disagreements and differences are less polarizing. Some of the benefits that can be offered include keeping the person informed by letting them know of things that might affect them, offering information, recognizing and rewarding community serving activities, giving the person recognition by inviting their participation in task forces and groups, offering technical assistance, offering cost share approaches, pointing out potential tax benefits of voluntary restrictions, etc.

With these model guidelines in mind, an on-site visitation program should be developed. In many cases it will be the person with designated "wellhead protection manager" responsibilities who will carry out this program. In other instances, communities have used retired civil servants or professionals to conduct this sort of outreach effort after having been trained themselves.

Groundwater Guardian

The Groundwater Guardian Program is one of the activities of a national organization called The Groundwater Foundation. This is a widely acclaimed program and Virginia localities are encouraged to become participants. Becoming a Groundwater Guardian community is demanding but the protection and recognition rewards justify the challenge. The Groundwater Foundation also supports local ground water festivals and youth oriented education. Figure 10 below is the website http://www.groundwater.org for this organization.

Figure10 – Groundwater Foundation Website



The Job of Oversight

Many people are familiar with a cartoon character who, when asked who is responsible, crosses his arms and says "not me, it must be them." To avoid this problem of nobody taking responsibility for wellhead protection, it is important that someone be given this crucial task, especially in communities whose only public water supply comes from ground water. It could be a new person hired for this purpose or this task could be assigned to existing staff as part of a redefinition and reallocation of duties. Likely candidates would include a local planner, someone in engineering or public works, a staff member of a utility department, or someone in general government management. It is also possible that a Planning District Commission might fulfill this role on behalf of a number of its member counties, towns, or cities. Since interjurisdictional cooperation is needed in source water protection generally, the ideal would be to have both locally and regionally designated responsibilities.

The user of the following model should determine which attributes are essential for a person to be qualified and which are not essential but desirable in the ideal candidate. How much experience is necessary is also left for user determination. If a position is to be advertised, each locality will have its customary language regarding equal employment opportunity and any residency requirements.

The following is a model component describing both duties and qualifications of a position to be called the "Wellhead Protection Manager."

Model Text for Wellhead Protection Manager Job Description

1) Duties

a) Leadership of the wellhead protection program, serve as the initial point of contact for all matters concerning wellhead protection, be a source of information about the wellhead protection program and about existing and future public water supplies utilizing ground water sources.

b) Represent the locality in communications with other local governments as well as regional, state and federal agencies and developing memoranda of cooperation with these entities.

c) Regularly update and monitor progress in implementing the comprehensive plan regarding wellhead protection, ground water and related factors and report this progress to elected or appointed officials.

d) Develop and implement an on-going public education and outreach program and build support for wellhead protection in the community.

e) Follow-up on needs revealed by monitoring progress to develop regulatory and non-regulatory proposals and public support for additional or improved implementation measures.

f) Develop proposals for projects to be considered for funding in the Capital Improvement Program and related budgets.
g) Identify sources of external funding including federal, state and private sources of grants, loans and/or methods of joint funding.
h) Participate in the process of development review to assure that subdivisions, site plans or other submittals meet requirements and guidelines for wellhead protection.
i) Participate as a member of the locality's emergency operations team and represent the locality in relating to regional and state emergency planning and operations.

2) Qualifications

a) Education – degree or equivalent knowledge and experience in urban and environ mental planning, engineering, geology or public administration.

b) Knowledge

1) Familiarity with federal and Virginia statutes, regulations and programs addressing issues of ground water quality and quantity;
2) Familiarity with Virginia laws and programs related to local planning, zoning, subdivision and related tools, and;
3) Familiarity with federal, state, university and other sources of data regarding ground water, geology, population forecasts and other factors pertinent to wellhead protection.

c) Skills

1) Ability to work cooperatively with the public, land owners, business leaders and others in both large meeting and small one-on-one settings;
2) Ability to achieve consensus among groups and individuals with diverse perspectives and interests;
3) Excellent written and oral communication skills, and;
4) Ability to use computers for working with large databases and mapping

In terms of the three levels of commitment discussed throughout this report, a Basic approach might be to assign the duties above to a volunteer, an intern or a citizen task force; an Intermediate level might rely on existing local or regional staff; while the Advanced approach might mean hiring a new person or creating a new position.

Notes on Chapter 5

- Notes on informational brochure.

- Notes on visitation.

- Notes on Groundwater Foundation.

- Notes on assigning responsibility.

Chapter 6

Conclusion: How is Your Community Doing?

This concludes this report on model components. The following chart can serve as a useful summary and checklist to see where a locality stands in its progress of implementing wellhead protection.

Figure 11: Charting Your Progress

	Have Achieved Our Desired Level of Implementation	Additional Work Needed
Comprehensive Plan (Chapter 2)	yes/no	yes/no
Memorandum of Agreement (Chapter 2)	yes/no	yes/no
Capital Improvement Program (Chapter 2)	yes/no	yes/no
Emergency Operations Plan (Chapter 2)	yes/no	yes/no
Zoning Ordinance (Chapter 3)	yes/no	yes/no
Subdivision Regulations (Chapter 3)	yes/no	yes/no
Site Plan Review (Chapter 3)	yes/no	yes/no
Local Septic Tanks Requirement (Chapter 3)	yes/no	yes/no
Use Value Taxation (Chapter 4)	yes/no	yes/no
A-F District (Chapter 4)	yes/no	yes/no
Education and Outreach (Chapter 5)	yes/no	yes/no
Wellhead Protection Manager (Chapter 5)	yes/no	yes/no

Notes on Chapter 6

- Next steps

Appendix: Other Useful Resource Documents

A Guide to Wellhead Protection, by Jon Witten and Scott Horsley with Sanjay Jeer and Erin K. Flanagan, American Planning Association, Planning Advisory Service, Report Number 457/458

A Unified Development Ordinance, by Michael B. Brough, American Planning Association, Planners Press

Community Development Report Series: This series of reports is now partially out of print. Those available include the Local Planning Commission, Zoning, the Language of Planning and the Capital Improvement Program. These titles are available in limited quantities from DHCD (Ms. Shea Hollifield) at 804/371-7030. Many Planning District Commissions have copies of the full series in their libraries.

Growing Smart Legislative Guidebook: Model Statutes for Planning and the Management of Change, American Planning Association, Phase I Interim Edition

Industrial Performance Standards For a New Century, Jim Schwab, American Planning Association, Planning Advisory Service, Report Number 444

Model Subdivision Regulations, Second Edition, by Robert H. Freilich and Michael M. Shultz, American Planning Association Planners Press, 1995

Performance Standards for Growth Management, editor, Douglas R. Porter, American Planning Association, Planning Advisory Service, Report Number 461

Preparing a Conventional Zoning Ordinance, by Charles A. Lerable, American Planning Association, Planning Advisory Service, Report Number 460

State Source Water Assessment and Protection Programs Guidance: Final Guidance, US Environmental Protection Agency, Office of Water, EPA 816-R-97-009, August 1997